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70th Annual Meeting

MEDICAL SOCIETY OF VIRGINIA

Richmond—October 3, 4 and 5, 1939

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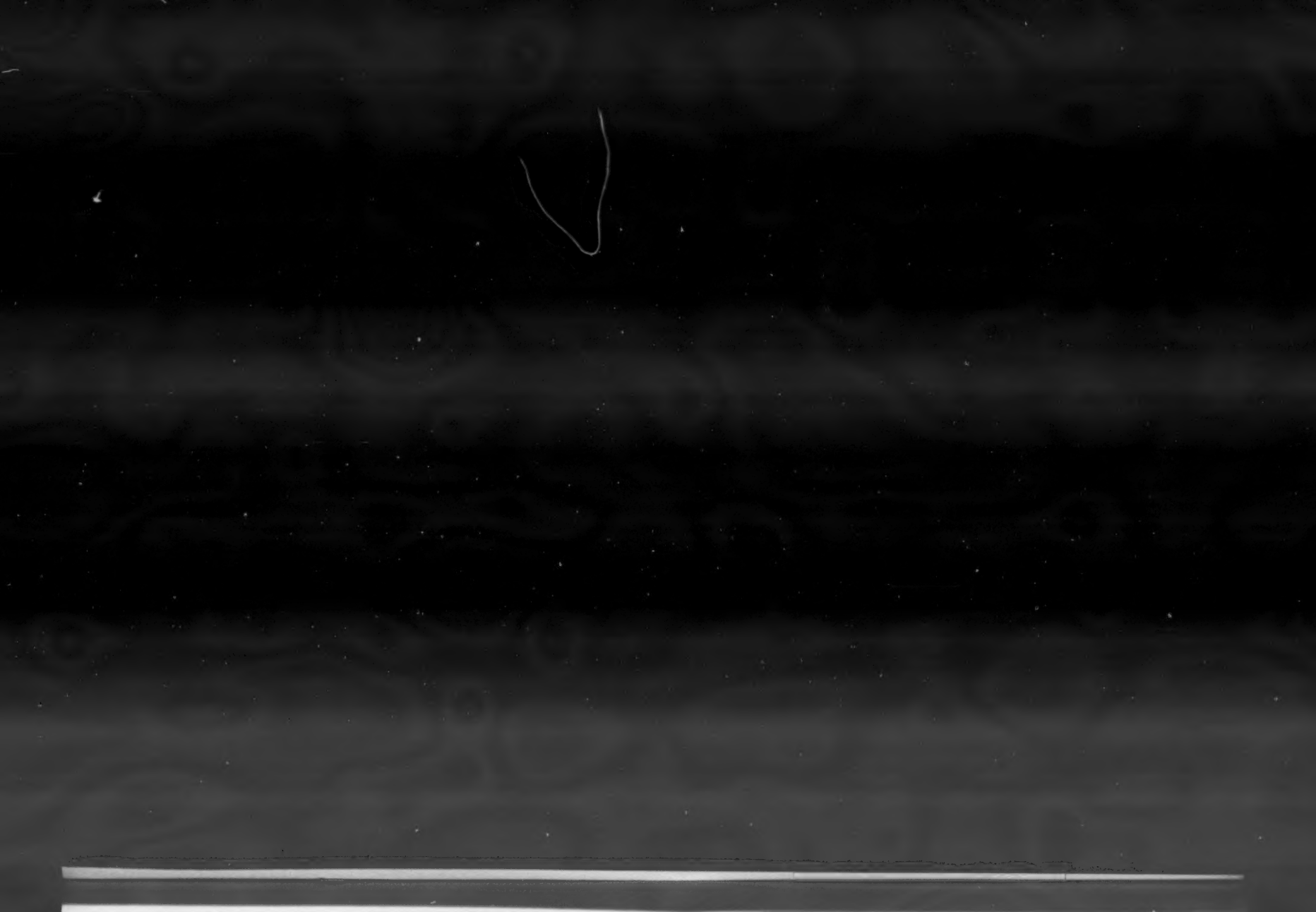

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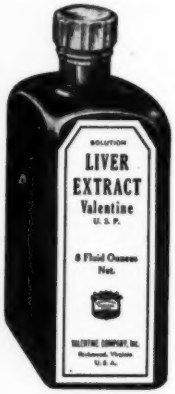

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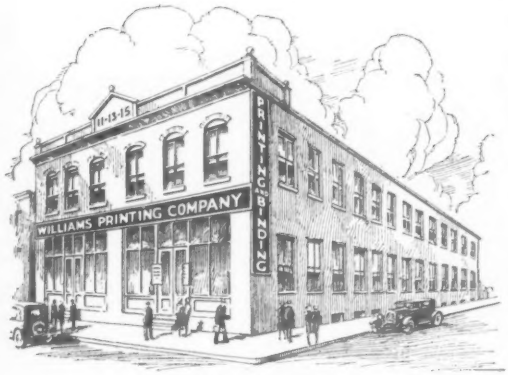

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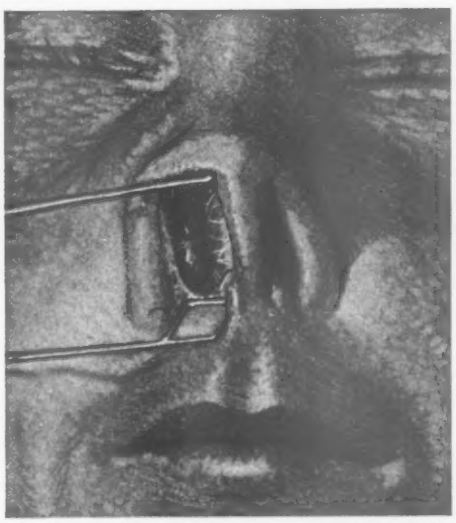

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RICHMOND, VA., AUGUST, 1939

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THE PATHOLOGIST LOOKS AT MEDICINE.

FRANK L. APPERLY, M.A., M.D., D.Sc.,
Professor of Pathology, Medical College of Virginia,
Richmond, Virginia.

It is an old saying that the onlooker sees most of the game, in the sense that he can take a more general view and perhaps make a better assessment of the game as a whole, than the individual player. In a somewhat similar way the pathologist—or at any rate the pahologist who takes all medical science as his field, and because in a sense he also sits on the side lines—is perhaps in a better position than anyone else to see what, biologically speaking, medical science really is, what it can and cannot accomplish, what the physician is really trying to do, and along what avenues medical science is likely to develop.

First, let us define our terms. By pathologist I do not mean the man who does little more than grind out reports on strange fluids or excised tissues—a sort of hand-maiden to the physician or the surgeon, however necessary these may be. The real pathologist may have to do this as part of his duties, but he is something much more. He is a scientist, who, in the field of abnormal biology, is striving to increase our knowledge of the natural history of disease and make it exact and organized. Just as our knowledge of normal man (to confine ourselves to human pathology) is for convenience divided into Anatomy, Physiology, Biochemistry and Psychology, which treat of man in his more accustomed or "normal" relationship with his environment, so we can likewise divide up our knowledge of man in his abnormal environments into Morbid Anatomy, Morbid Physiology, Morbid Biochemistry and Morbid Psychology. All of these together comprise Pathology, obviously an immense field for study. Since, in addition, it is necessary to study the varying nature of the abnormal environment—bacterial, climatic, physical, chemical, psychic, etc.—in order to understand the nature of the interaction of these forces and the individual, it will be clear that no man can cover more than a small part of the field. It now takes four professors to train the student in the four divisions under which he studies normal man. Perhaps in time pathology will likewise have its multitude of professors!

In my student days, nearly thirty years ago, pathology, of course, covered a much smaller field. It was almost wholly morbid anatomy, a depressing science of destruction—necroses, phlegmons, hemorrhagic inflammations, gangrenes, malignancies, ulcerations, cavitations, degenerations, etc.—a truly Dismal Science!

Since then our knowledge, if not our teaching, has changed. The newer knowledge of pathological physiology has brought out pathology's far more important aspect, the body's aggressiveness in overcoming its difficulties, its determined attempts to restore and maintain its equilibria or to accommodate itself to the new situation, and its ever-readiness to cooperate with the physician (in spite of centuries of frustration at his hands). Surely a splendid effort of Nature to assert herself and emerge victorious—the Science of Nature Triumphant! The Science of Hope! The emphasis must now be on the mechanisms of recovery.

My thesis is that the teaching of pathology in many of our medical schools is along wrong lines, and is failing to give the young doctor any clear conception of what he is trying to do in his battle to maintain health or restore lost health. He is being taught too much of what we might call "analytical" pathology, too much about the primary lesion, its intimate causation and the accompanying morbid changes. Analytical pathology is, of course, one of the functions of the man of research, delving for the mechanism of disease. But the student in his professional life has to deal with living men and women

and is more concerned with the reaction of the individual as a whole rather than any single tissue or organ. Perhaps we can call this "synthetical" pathology, which would include not only causation and the local reactions of the affected tissue, but also the compensatory reactions of the remaining tissues, and, finally, the reaction of the peculiar personality of the individual to his illness, the psychoneurotic behavior which so commonly complicates the clinical picture.

Perhaps I can best clarify my remarks by an example. Let us take the case of chronic nephritis. When I was a student we learned first something about its etiology—and that did not amount to much. Then the professor gave a long and dreary description of its morbid anatomy, grossly, its small size and weight, granular surface, toughness and rigidity, adherent capsule, narrow cortex, blurred structure, increased pelvic fat, and so on. Then the microscopic description, the hyalinized glomeruli, the atrophy and disappearance of some tubules, the dilatation and the minute histology of the epithelial cells of others, the increase of connective tissue, the endarteritis, and so on and on. All very pretty. But I was not told how and why these changes occurred, what further changes they produced in the body, and—most neglected, but perhaps the most important of all—how the body attempted to compensate for the loss of function of these kidneys. Consequently, when later I entered the wards and found a man with indigestion, headache, giddiness, breathlessness, failing sight, frequency, with a large volume of pale low specific gravity urine etc., etc., it all meant nothing to me. There was no connection between the morbid anatomy of the kidney and the behavior of the individual!

It has taken a long time to realize that the body is an extremely unstable system, a delicately balanced equilibrium oscillating within narrow limits, the resultant of many forces acting in various directions. To every external change, small or large, it replies with definite reactions tending to the re-establishment of its equilibrium. A constant succession of actions and reactions is taking place in the body. The study of any disease therefore involves much more than the changes occurring in an organ, but the changes, passive and reactive, occurring throughout the whole body in an attempt to re-establish equilibrium or maintain health. This "synthetical" pathology takes the whole body into consideration. Without this our studies are meaningless.

Still keeping to our case of chronic nephritis we might perhaps study the case under the following convenient divisions:

1. Nature of the injurious agent—
   Physical or chemical;
   Living (*bacteriology and parasitology*).
2. Changes produced in the affected tissues—
   (a) Passive injuries (degenerations, necroses, etc.);
   (b) Reactive effects, efforts to repair (inflammation and repair). (*Morbid Anatomy*).
3. Altered behavior of the organism—
   (a) Hypofunction of the injured organ or tissue;
   (b) Hyperfunction of the other (healthy or less affected) organs or tissues in an endeavor to re-establish equilibrium. (*Pathological Physiology*).
   (c) The mental reaction of the patient's personality to his illness and its accompanying problems. (*Morbid Psychology*).

The whole of this altered behavior constitutes *Symptomatology.*

Whereas morbid anatomy is of importance in that it helps to indicate the probable methods by which injurious agents produce their effects and enables us to explain the mechanism by which the hypofunctioning of the affected organs is brought about, it is not, I believe, of as great importance to the young student-doctor as a knowledge of the mechanism by which the other more healthy organs are trying to re-establish equilibrium by taking over the functions of the more injured organs. Thus, in chronic nephritis the loss of the glomeruli and tubules means some loss of the power of excretion. Waste products tend to accumulate within the body. But the body has other organs which can take over these excretory functions when pressed to do so. There is excretion by the skin, the lungs, the gastro-intestinal tract, the tears, and even the peritoneal, pleural and pericardial serosae revert, under stress, to their old primitive cœlomic function of excreting waste into their cavities.

Whereas the pathologist's function is the investigation of the whole consequences of abnormal environment on the organism, to the physician falls the art of applying this knowledge to diagnosis and treatment. The importance of a deep knowledge of

Nature's methods of vicarious function is therefore obvious. The recognition of the principles underlying the production of symptoms is essential for their interpretation and for diagnosis. These principles likewise form the basis of his treatment. He can best give rest to, and an opportunity for repair to take place in, the diseased organ or tissue by making use of his knowledge of Nature's compensatory mechanisms, e.g., by augmenting these vicarious activities and thus reducing the stress on the diseased tissue. In chronic nephritis this might be accomplished by the exhibition of those measures—physical, pharmacological, etc.—which increase excretion by sweating, by increased transudations from blood to intestinal lumen, and, perhaps, some day, by irrigation of the larger serous sacs.

Perhaps we can briefly summarize the principles of treatment as follows:

1. Prevention of infection, injury, etc.—
   (a) By removing the cause, as in malaria, yellow fever, typhoid, etc.;
   (b) By raising bodily resistance — good food, fresh air, exercise, vitamins, vaccines, etc.
2. If infection or injury has occurred—
   (a) Measures against the causative agent—antitoxins, arsenicals in syphilis, etc.;
   (b) Rest to the injured organ or tissue
      i. By reduction of work—rest in heart disease, low portein diet in nephritis;
      ii. By encouragement of compensatory mechanisms—sweating, fluids, and salines in nephritis; increasing blood flow in anemia.
   (c) Substitution therapy—insulin in diabetes, thyroid in myxedema, blood transfusions in anemia, endocrine therapy, etc.;
   (d) The mental aspect—suggestion, faith, discussion and creation of a better mental attitude towards life and its problems.
3. When all these are of no avail—Surgery.

So far we have dealt with the kidney alone. What about the patient himself? The good physician knows that "our remedies oft in ourselves do lie, which we ascribe to Heaven." His job is to restore, if possible, this man to equilibrium with his environment. Perhaps his patient not only has chronic nephritis, but is unemployed, in debt, with a sick wife and a young family—rather a large order of equilibrium re-adjustment for one man! But the physician, as citizen, and often an influential citizen, may be able to do a great deal, and furthermore can, by wise guidance, create such an attitude of mind in his patient as may save much unnecessary worry and mental suffering. Thus the good doctor is not only physician, but good fellow-citizen, lawyer, priest or parson, all rolled into one. All of these attributes are necessary in the physician if he is to carry out his full duty as a restorer of equilibrium with environment.

What of the pathologist himself as teacher? On him falls a very grave responsibility. Because it is he who first deals with what disease actually is, and so creates in his students the attitude of mind towards disease in living patients, the pathologist has in his hands a very large share in the shaping of the whole future of medicine. The teacher of pathology, therefore, must be much more than a tissue-pathology merchant, but a man of wide outlook, experience, wisdom, a philosopher and a man—with a sense of humor!

CANCER OF THE BREAST.*

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and
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Mortality from cancer of the breast in the registration area of the United States for 1933 was 12,484 deaths. In the District of Columbia for 1934, there were eighty-five deaths. The percentages of mammary cancer deaths was 9.7 per cent for the total registration area of the United States, and 10.8 per cent for the District of Columbia. Per 100,000 of population, the mortality was 9.9 for the United

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States, and 17.1 for the District of Columbia; or the more appalling figures, based on female population, 19.4 per 100,000 in the United States, and 32.3 in the District of Columbia (Herring).[7]

Various causes may be assigned for this monstrous affliction which besets us, chief among them being the increase in the life span, which brings more people in the period of life in which the disease is most common; secondly, and most important, is the relatively few patients who consult their physician in the early stages of the disease.

If we are to treat mammary cancer adequately and efficiently, we must have some knowledge of the types of diseases and tumors to which the female breast is heir. The benign lesions need not detain us, with the exception that we must ever remember that certain benign lesions may become cancerous (Cahill).[3] Of the malignant tumors of the breast, we may for practical purposes accept Ewing's clinical classification quoted by Christie:[4]

(1) Cystadenocarcinoma arising in cysts or large ducts. They are of slow growth and among the less dangerous of breast cancers.

(2) Medullary or encephaloid tumors which are bulky, soft, very cellular tumors.

(3) Acute carcinosis. This group is characterized by its rapid progress, with local inflammatory signs.

(4) Scirrhous carcinoma. A small, hard, acellular growth which often results in atrophy and shrinkage of the entire breast.

(5) Fibrocarcinoma is the type which arises in cases of chronic mastitis. It comes on slowly with gradual hardening of a considerable portion or even all of the breast without definite tumor formation.

For the purpose and from the standpoint of treatment, we may accept Pfahler's[4] very practical classification of stages I, II and III.

Stage I. A small, isolated, movable tumor in the breast. No palpable lymph nodes. No roentgenologic evidence of intrathoracic or skeletal metastases.

Stage II. Large tumor in the breast. Fixation of tumor to skin or pectoral muscles, with palpable axillary lymph nodes, or microscopic evidence of axillary metastases.

Stage III. Tumor in the breast with axillary lymph nodes, and supraclavicular or distal metastases.

Controversy, particularly between surgeons and radiologists has waned and waxed, and there is no immediate prospect of settlement. That there is controversy may be proof of the adage that when doctors disagree there is no collusion. It is also prima facie evidence that neither method, surgery or irradiation alone, adequately solves the problem.

Reports of so-called "five-year cures", that is, no recurrence of the disease in that time, are always interesting. In the analysis and interpretation of such figures and statistics, we should recall that properly diagnosed cases have survived more than five years without treatment of any kind, and cases have recurred up to twenty years following early and adequate diagnosis and the most radical treatment. Nor is what may be called a "cancer diathesis or predisposition" a too bizarre supposition.

Statistics on the result of treatment by irradiation, with and without surgery, are summarized in the 7th Annual Report of the National Radium Trust and Radium Commission, Great Britain, (1937)[9] as follows:

Percentage of net surival rate, five-year; from all methods of treatment, which included irradiation:

Stage of Disease	Five-Year Net Survival	Number of Cases
I	49.4%	85
II	43.7%	122
III	24.0%	196
IV	7.2%	72

Forsell,[6] of Radium hemmet, Stockholm, reports on seventy-five cases in which the treatment was surgery and post-operative irradiation. Twenty-nine per cent were alive and well five years. In forty-five cases in which pre- and post-operative irradiation was used, 40 per cent were alive and well five years. The average five-year result with surgery alone in such cases is 20 to 25 per cent. Irradiation can therefore be credited with doubling the five-year survival rate in Radium hemmet. Portmann,[13] in 1937, reported the results in eighty-five non-irradiated, and eighty-five post-operative irradiated cases. The five-year results were as follows:

Stage	I	II	III	All Cases
Surgery alone	100%	48%	0%	35%
Surgery and p.-o. irradiation	95%	71%	0%	42%

Stage I group, which comprises 30 per cent of all cases, can be cured (five-year survival) by surgery or surgery plus irradiation. Stage II group comprises 25 per cent of all cases. Half of this group, 50 per cent, will survive five years if treated surgically. Seventy-five per cent will survive five years if irradi-

ation is used in addition to surgery. Stage III group comprises advanced cases in which there was no five-year survival. Irradiation therapy alone should be used in this group, the patient thereby living longer and more comfortably.

Pfahler and Vastine,[12] in 1938, reported the five-year results in 400 cases treated by surgery and irradiation. Their conclusions were that 52 per cent of cases treated by post-operative irradiation survived five years, and, further, that 57 per cent of cases treated by pre- and post-operative irradiation survived five years. They review the reports of many clinics and analyze statistics which tend to show an improvement of 11 to 73 per cent in five-year survivals when surgery and irradiation are used as compared with surgery alone. They further collected large numbers of reported cases from the literature which show a 25 per cent improvement in the combined method of treatment over operation alone.

Adair,[1] in 1937, reported his observations with particular reference to pre-operative irradiation. These were:

1. Clinical disappearance of breast tumor	60%
2. Clinical regression of axillary nodes	50%
3. Complete microscopic destruction of the tumor cells	24%
4. Sterilization of the cancer cells	17%
5. In the axillary nodes: Sterilization	6.5%
Disintegration	9.0%

Similar experiences are reported by Bade and Badden,[2] Keynes,[8] Newton[10] and others. The consensus of opinion is that in stage I cases almost 100 per cent of five-year survivals may be obtained by surgery alone, or by surgery plus irradiation. In stage II pre-operative irradiation followed by surgery is the treatment of choice. Whether the surgery be conservative or radical will depend on the individual operator. In stages III and IV irradiation alone offers palliation and somewhat longer, more comfortable existence.

Case I, Fig. 1.—Showing bone destruction of the symphysis pubis.

The diagnosis of cancer of the breast depends upon the skill and judgment of the physician. Certain diagnostic procedures are used.

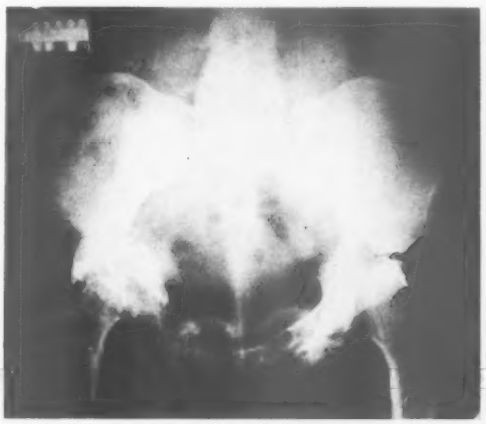
(a) Direct radiography of the breast.

(b) Mamography, in which the numerous duct outlets of the nipple are injected with an opaque medium (thorium dioxide, iodized oil, etc.).

(c) Injection of carbon dioxide subcutaneously and submammary, which throws into relief the breast tissue, enabling the roentgenologist to determine if a tumor, being present, is

1. encapsulated.
2. adherent to the skin.
3. adherent to the pectoral muscles.
4. infiltrating the breast tissue.

The ultimate diagnosis remains with the pathologist and stained serial sections. Punch biopsy is more or less a routine procedure in some clinics, but this method is not satisfactory. A specially trained and specially skillful pathologist is necessary for interpretation of findings. A negative report is of doubtful value, and irritation of a probable malignant



Case I, Fig. 2.—Showing bone regeneration of the symphysis pubis following roentgen therapy.

tumor is not desirable. Various grades of malignancy and various types of cancer may be present in the same tumor; and, lastly, if any section is done, the tumor should be removed *en masse* and presented to the pathologist for gross section in order that frozen sections of the portion most probably malignant may

be studied immediately or stained serial sections studied at leisure.

In consideration of the foregoing, it is our studied opinion that the rationale of treatment of a case of suspected breast cancer should be as follows:

1. Physical examination of the breast, noting size, shape and position of tumor, density, fluctuation, attachment to skin or deeper structures; palpation of axillae, supraclavicular and cervical regions. Avoid undue manipulation so that the cancer cells will not be forced into lymph channels.

2. Radiographic examination of the breast is of value. The injection of opague media is not recommended. The use of subcutaneous and submammary carbon dioxide is of somewhat more value. There is also less potential harm in the latter method. Radiography of the lungs and bony structures is advisable to rule out metastases.

3. Pre-operative irradiation,—high voltage (200 KV), heavy filter (2.00 mm. copper),—to at least three ports and preferably five, a total dosage of two to three thousand roentgens to each port. Daily dosage two hundred to three hundred roentgens.

4. Biopsy and simple to subradical mastectomy six to eight weeks following irradiation. Post-operative irradiation if, as, and when metastases appear.

The question of sterilization has been discussed at various times since the original observation fifty years ago that a patient with breast cancer, surgically sterilized, lived longer that the usual case, showed regression of the tumor, and metastasized more slowly. The argument presented is that the function of the breasts is inhibited when the endocrine stimulus of the ovaries is removed. This reasoning does not seem illogical. Various workers espouse the cause of sterilization, others consider it of no value, and therefore not necessary. We are of the opinion that any procedure not fraught with too much danger to the patient and offering hope, scant though it be, should be given respectful consideration. In our judgment, sterilization of the patient adds to comfort and longevity by inactivating to some extent the breast tumor and the breast tissue itself.

The roentgen treatment of any malignancy is based on the fact that embryonal cells are sensitive to, and destroyed by radium and roentgen irradiation. Tumors have been graded according to the number of mitotic figures per field as—slightly radiosensitive (grade I), moderately radiosensitive (grade II), markedly radiosensitive (grade III), and very radiosensitive (grade IV) (Broder). While this classification is of value, it must not be accepted dogmatically. The radiosensitivity of any tumor is its clinical behavior after adequate irradiation.

The following case illustrates the beneficial effect of irradiation. It is a stage III case, but the protocol will show that the patient had a longer and more useful life as a direct result of roentgen therapy. Pain was relieved, crutches and canes were discarded, bone regenerated, and the patient's morale and outlook markedly improved.

V.M., white female, aged forty-three, had pre-operative irradiation and radical right mastectomy in April, 1935. Microscopic diagnosis: adenocarcinoma. In November, 1936, patient returned on crutches for examination. There was no evidence of recurrence in the scar of the right breast, in the right axilla, or the right supraclavicular or cervical regions. The left breast showed a definite tumor which was thought to be primary, though, in view of her history, metastatic involvement could not be eliminated. Roentgen studies of the skeleton showed extensive destruction of ischium and pubis bilaterally. Deep roentgen therapy was immediately instituted to the left breast and pelvis.

Examination June 15, 1937, showed the areas in the ischium and pubis and the areas adjacent to the right acetabulum previously destroyed by metastatic carcinoma to be almost completely filled in with regenerated new bone. The left breast showed no evidence of tumor, though the nipple was still retracted. No glands were palpable in the left axilla. The patient had discarded her crutches, walked with one cane, felt well, and was particularly anxious to drive her car.

While this case is presented to illustrate regeneration of bone following irradiation, it is germane to state that she died the following year (1938) of generalized carcinoma. Clarkson and Barker[5] report a case of five-year cure of mammary cancer with multiple metastases to bone, so that while the prognosis is always unfavorable no case is entirely hopeless.

We may summarize that in the present state of our knowledge, the most successful treatment of cancer of the breast is that in which the patient is thoroughly irradiated before operation, subjected then to a subradical mastectomy and irradiated post-operatively if, as and when indicated.

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RELATION OF DEGENERATIVE DISEASES TO INDUSTRIAL EFFICIENCY.*

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In presenting this subject I do not expect to explode any theories or offer any solution of the problem, but, by its presentation, hope to stimulate some thought along biological lines.

Since every practitioner of medicine, regardless of his specialty, is daily contacting those patients whose age, in body, is out of proportion with their age in years and, as degenerative diseases or those disorders characterized by hypertension, organic cardiac arrhythmias, angina pectoris, coronary thrombosis, weakness of the heart muscle, arteriosclerosis and sclerosis of the kidney are now so common, it behooves us as physicians to be alert in the detection of them even when we are consulted for only minor and trivial disorders. Unmistakable evidence of degeneration is noted in many industrial employees whom we minister to for only minor injuries.

We have discussed and collaborated at great length and with much seriousness and with great wisdom, but despite all our efforts to unravel the mysteries of this progressive train of symptoms, we are still at a loss to know what causes degenerative diseases and therefore we have no receipt for their prevention. Those who use neither alcoholic beverages nor tobacco emphatically state that the use of these commodities causes a person to deteriorate more rapidly. The biological chemist then comes along and states that he finds no scientific evidence to support the theory that whiskey or tobacco plays any part in the causation of arteriosclerosis, nephritis or myocarditis. While the argument goes on, both the non-users and users succumb to the malady in about equal proportions. The thermocouple apparently shows that the use of tobacco in both users and non-users produces a peripheral vaso-constriction with a reduction of surface temperature, which constriction, if persisted in, might theoretically produce some permanent damage to the arteriole walls, causing a sclerosis and an increased peripheral resistance with a resulting hypertension. Where there is no demonstrable local or systemic pathology in the blood vessels or kidney, the mechanical explanation of hypertension is hard to accept, and does not explain cases of malignant hypertension.

It is hard to determine whether the kidney involvement is only a part of the sclerosing process or is primary, and the arteriosclerosis then results from

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the stretching of arteries with resulting sclerosis. The layman, and sometimes his medical adviser, attaches great importance to a rise in blood pressure when that increase may be compensatory and may be useful in making up for the loss of glomerular filtering surface.

We frequently see cases which have led an exemplary life and have never used any of the abovementioned poisons, have always lived moderately but well and have not apparently eaten to excess, and in a routine examination, to our surprise, we discover that they have considerable hypertension. We run across families in which nearly every member exemplifies this premature degeneration and deterioration and explain it by saying that they have inherited poor tubing and vascular material.

That statement does not explain anything to an inquiring mind, and when we ask "why," the answer is lost in conversation. We occasionally see several albino children in the same family with deficient pigmentation in the iris, hair, and skin, and deficient mentality associated with a malignant hypertension and wonder whether the hypertension is also an inherited deficiency of that hypothetical substance, which, by its specific action, stabilizes or neutralizes that pressor substance in the blood and thereby maintains normal arterial tension.

Aschheim, Zondek, Novak and others have worked out in an understandable manner some of the mysteries of the internal secretions of the female, but, so far, man has been left largely alone to work out his own salvation. As man and woman are of the same biological species and are governed by the same laws of nature except for the activities of their specific internal secretions, could not some of the hypertensions coming on in men about the mid-period of life be due to disorders of internal secretions the same in the male as in the female? I firmly believe that some enthusiastic biological chemist, who would painstakingly study degenerative diseases with the thoroughness that characterized the work on insulin, could add materially to our knowledge of these disorders and it might be possible to discover the specific toxin or toxins causing this group of symptoms. I am inclined to believe that the etiological factor in hypertension is either the production of normal or abnormal waste products by the host, the slow absorption and slower elimination of normal metabolic products or some abnormality in the endocrine system. May the world soon give us a man who can isolate and measure these normal and abnormal metabolic and toxic products!

No consideration of degenerative diseases would be complete without at least a cursory consideration of those hypothetical, and in some cases proven little catalytic agents commonly called vitamines. Six definite and specific vitamines have been identified and fairly universally accepted as performing some useful bodily function. They are vitamins A, B_1, B_2 (G), C, D, and E, and there are eight (8) minerals that exert a beneficial influence, namely, calcium, phosphorus, iron, copper, manganese, magnesium, iodine and zinc. Copper acts as catalyst with iron in stimulating hematopoiesis, and zinc is found in insulin and improves its efficiency.

The League of Nations Health Committee reported that "The deficiencies of modern diets are usually in the protective foods (i.e., foods rich in minerals and vitamins) rather than in more strictly energy-bearing foods (calories)." The tendency is for people to eat energy-producing foods to the exclusion of protective foods. Someone has gone so far as to say that vitamine C prevents arteriosclerosis. Vitamine deficiency does produce pathological states and degenerative diseases are associated with vitamine deficiency disorders. It does not seem logical to assume that the vitamine deficiency is always a natural consequence or a complication superimposed on a long standing degenerative disease, for, in the light of our present knowledge, it seems logical to assume that as vitamine deficiencies are found before the development of degenerative disorders, they might sometimes be the fore-runner and the end-result of such vitamine deficiency.

As advanced degenerative disease in arteries and kidneys is frequently associated with calcification, could this calcification be due to excess activity of vitamine D associated with a normal or abnormal amount of blood calcium? I do not know. Lobbe and Heintz say that arterial obliteration in diabetes is caused by localization of cholesterol in the tunica intima of the arteries. Joslin says it is probably caused by faulty fat metabolism. Others state cholesterol in the diet predisposes to arteriosclerosis. A confrere reported an advanced case of arteriosclerosis with arcus senilis at forty-nine in an individual whose main article of diet for years had been eggs. It seems that some thought toward revising the diet of diabetics and others with regard to the cholesterol content is certainly indicated.

We, as physicians, are supposed to advise our patients how to live so that they may round out a long useful life without premature degeneration, but the fact that our profession stands high in furnishing mortality statistics in cardiac and arterial accidents, makes us realize that the secrets of longevity are almost as obscure now as in the days of Ponce de Leon. William Mayo said that coronary disease is an increasing factor in the death-rate among physicians, surgeons and other professional men, explainable on the theory of high tension living and sedentary life. As the causes are obscure and many cases are well developed at the time of our first examination, our only hope is in delaying, by sensible advice, and by the use of a few properly selected drugs, the progress of the disorder. The obscure and latent pathology of the myocardium and coronary arteries is so difficult in their detection by ordinary office examination methods of the average physician, until more simple and less expensive apparatus is discovered for their detection, many cases will still go unrecognized at a time when something might be done for their comfort and prolongation of life. When you examine a patient in your office and find nothing especially wrong, and upon his arrival home you are summoned to see him and, upon your arrival, you find him lying dead on the floor, you have to assume that you were either too dumb to know his true condition or ordinary methods of accurate diagnosis are markedly inadequate and primitive.

Every person who uses his hands and physical strength for a livelihood is dependent on his physical well-being for a continuation of his gainful and profitable employment. When this is impaired his productivity is correspondingly reduced to the detriment and expense of his employer. Under our American system of mass production and quick-turnover, such physical deficiency costs the employer millions of dollars each year. Every employer of labor has more or less dead weight to carry along. If that employee is in the employ of some common carrier, he becomes not only a menace to himself but also to the traveling public. In 1912 the accidental death-rate of locomotive engineers was 318 per 100,000, but things have improved to such an extent that now it is no greater than in other vocations.

In the decade 1912 to 1922 deaths from organic heart disease in the operating branch of American railroads increased 74 per cent while there was a decrease of 9 per cent in the same age group of males otherwise employed. Deaths from cerebral hemorrhage increased in this same group 11.4 per cent and reduced 2.2 per cent in the civilian group, and diabetes was decidedly more prevalent in the group representing the railroads. Due to lack of later statistics, the prevalence of these disorders in the railroad group is not now known but it probably closely parallels these figures, and is gradually increasing the same as in the general population.

Operation and maintenance of industry is naturally a hazardous occupation and every employee should enjoy reasonably good health or certainly should not have an advanced stage of any degenerative disease. Upon employment his true physical condition is sometimes known, but never afterward—due to lack of periodic physical checkup. Every industry in the South and probably in the country has employees who are holding their positions by seniority or sympathy instead of physical and mental efficiency, and only a casual inspection discloses the fact that they are a liability to their employer, a hazard to themselves and a menace to those whose safety is intrusted to them. In every shop where power machines are in use there are worn-out, physically unfit men operating these machines where a vertigo or a minor mis-step would catapult them to their deaths or permanent injury at the expense of their employer.

Physical impairment contributes to bad judgment, inefficiency, lack of production and to physical hazard and injury not only to the employee but to those in contact with him. How can this condition be corrected? The union has strenously opposed periodic physical check-ups and many of the employees refuse physical examinations, unless compulsory, for fear of disqualification. The union has insisted on an employee's retention on account of his seniority rather than physical and mental efficiency. If industry would have a new employee sign an agreement or contract at the time of employment, and before he is eligible for union membership, in which he agreed to comply with the rules of the company and have one of these rules state that every employee, before employed, must have a complete physical examination with Wassermann test, and must be re-examined every three to five years or oftener, if deemed advisable by the company, the next few years would show a great improvement in the health and efficiency of labor and accidents would be mate-

rially reduced. Unfortunately the astute politician has used the labor unions as a tool and welcomed their support, and then ignored the issues arising from their over-zealous activity. May we soon have a leader who will have the courage to tell the belligerent labor factions just what he and the American public really think about their crippling and illegal activities.

Those physically unfit and senile cast-off employees must be cared for, which introduces the question of industrial pensions. Anyone receiving benefits from any fund should be a contributor to that fund. Under the legislation now in force, those individual employers of labor who are contributing a considerable amount to the fund under the Social Security Act, cannot participate in its benefits even though they become insolvent at some future date. Some feel that an employer of labor should bear some of the responsibility of his care after he is "worn-out by fair wear and tear in service". While federal legislation has authorized old age and disability allowances in industry, the efficient and impartial and economic application of the law should be vested in a board of men of unquestioned integrity, untrammeled by presidential or legislative coercion, influence or intimidation.

As practitioners of medicine, even though some may call themselves surgeons, we should ever be alert for physical defects, independent of the injury we are treating, which might make that employee a potential source of danger to his fellow-man and an expensive liability to his employer.

ECLAMPSIA.*

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Eclampsia is an acute toxemia of pregnancy which is usually accompanied by clonic and tonic convulsions, during which there is loss of consciousness. In most classifications of toxemias of pregnancy, eclampsia is synonymous with convulsions, the presence of which differentiates these patients from the preëclamptic group.

In the State of Virginia in 1935, there were 290 puerperal deaths and seventy-four,[1] or approximately one-fourth, of these were due to puerperal eclampsia. In 1936 eclampsia was the cause of seventy maternal deaths in this State. A review of all puerperal deaths in Virginia since 1922 shows that eclampsia has been given as the cause of approximately 25 per cent of the maternal deaths occurring in each year, and in some years it has caused more than one-third of the puerperal deaths.

Several authors, Stander,[2] Peckham,[3] Eastman,[4] Douglas,[5] Dieckmann[6] and others have established the fact that the late sequelae of eclampsia are responsible for many deaths classified as cardiovascular renal disease among comparatively young women.

The cause of eclampsia remains unknown. Eastman has stressed the arteriolar spasm in toxemia patients, and a recent paper by Vorzimer[7] has emphasized "The Endocrine Basis of Toxemia of Pregnancy".

The prevention of eclampsia offers the best method of reducing both the immediate and the remote maternal mortality associated with this complication. Patients should seek medical care whenever pregnancy is suspected, and return to the physician or clinic at regular intervals, at least once each month during the first seven months, then every two weeks until the last month when they should return each week and whenever any unusual symptom appears.

The physician should make a complete examination and record the patient's weight, blood pressure, urinary findings and any evidence of disease or abnormality at the first visit. Whenever hypothyroidism is suspected the basal metabolic rate should be determined. Vorzimer[7] has classified the evidence of glandular disease under the following headings: (1) Body weight; (2) Hair distribution; (3) Stature; (4) Form of pelvis; (5) Basal metabolism; (6) Blood proteins.

The same author has stated "our observations indicate that 30 per cent of women presenting the endocrine stigmas described above (stocky frame, obesity, abnormal distribution of hair) will develop toxemia of pregnancy." In toxemia patients the

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albumin globulin ratio is often changed, and sometimes reversed.

After the initial examination regular prenatal observation is essential in the prevention and management of the toxemias. The blood pressure is frequently low in the early months of pregnancy, and a gradual or rapid increase in pressure, particularly the diastolic, is often an early indication of toxemia. We have found the relative elevation more important than the use of an arbitrary level, such as systolic 140, diastolic 90.

A slight albuminuria usually occurs in preëclampsia. Any increase beyond a cloudy precipitate usually indicates a dangerous toxemia. The rate of increase of albuminuria when studied with changes in the patient's weight, edema, blood pressure and headache or other symptoms, usually enables one to determine the advisability of terminating the pregnancy.

Our treatment of the early toxemias consists of a diet low in salt content but otherwise normal, fluids freely, including skimmed milk, good elimination, usually with magnesium sulphate orally if necessary, and plenty of rest in bed. Recently we have added calcium and vitamines B_1 and D to the diet. Often we give a high protein diet. Any patient under this treatment who fails to respond quickly and shows signs of an increasing toxemia should have her pregnancy interrupted before she goes into the convulsive stage. Her pregnancy should be terminated regardless of the number of months of gestation. (The exception to this plan of treatment includes those patients whose religion forbids the interruption of pregnancy, and a few patients who after knowing the dangers are willing to take the additional risk associated with a severe toxemia.)

Last year we reported that the incidence of the toxemias of pregnancy was 11.4 per cent at the Medical College of Virginia Hospitals,[8] and the incidence of eclampsia was 2.02 per cent. Two-thirds of our eclamptic patients had no prenatal care, and the remaining one-third had inadequate care, usually only one visit to a physician or clinic. By Eden's classification, 54 per cent of our patients had severe eclampsia and in the past three years this has increased to 65 per cent.

The value of prenatal care in preventing eclampsia can be emphasized by a study of 790 consecutive obstetrical patients during the past five years at Saint Luke's Hospital in Richmond. These were all private patients and most of them consulted a physician early in pregnancy; fifty-eight patients or 7.3 per cent had some type of toxemia and fifty-two of these were probably preëclamptic toxemias. Eclampsia did not occur in any patient, but we think several patients in this group would have had convulsions in a few more hours, if treatment had been delayed.

During the past three years we have admitted to the Medical College of Virginia Hospitals sixty-four eclamptic patients, and only four died. A study of the four deaths leads one to believe that eclampsia occurred in these women as an acute toxemia superimposed upon previously damaged kidneys.

Fifty-five patients were primiparae and two of these, or 3.63 per cent, died. Nine patients were multiparae, and two, or 22.22 per cent, of these died. This indicates that eclampsia occurs most frequently in young women, but it is most fatal in women who have borne children, a group in which permanent kidney damage is most frequent. Half of our patients were less than twenty years old. Five patients or 7.81 per cent were over thirty years old, and this group includes one-half of the maternal deaths.

Since 1934 the onset of labor has been spontaneous in forty-three or 67.18 per cent of our eclamptic patients. Labor was induced (usually by artificial rupture of the membranes) in 13 or 20.31 per cent of these patients.

The type of delivery was as follows:

Spontaneous—37 or 57.81 per cent.

Forceps—17 or 26.56 per cent.

Caesarean Section before labor—6 or 9.06 per cent. (One post mortem section.)

Version—1 or 1.56 per cent.

Craniotomy—1 or 1.56 per cent.

Three patients died undelivered but one of these was sectioned after death.

CHART 1.

ECLAMPSIA. MATERNAL MORTALITY UNCORRECTED. JANUARY 1, 1922, THROUGH DECEMBER 31, 1937. 16 YEARS.

TOTAL PATIENTS 317.

1. January 1, 1922, through December 31, 1927. Total 106 patients. Maternal Mortality 28.1 per cent.
2. January 1, 1928, through December 31, 1932. Total 107 patients. Maternal Mortality 21.49 per cent.
3. January 1, 1933, through December 31, 1937. Total 104 patients. Maternal Mortality 7.69 per cent.
4. January 1, 1935, through December 31, 1937. Total 64 patients. Maternal Mortality 6.25 per cent.

In group (1) eleven patients were omitted when the maternal mortality was calculated because the charts failed

to show the final condition of the patients. They might have decreased the maternal mortality rate for group (1) to 24.69 per cent or increased the maternal mortality rate for this group to 43.27 per cent.

CHART 2.

ECLAMPSIA. INFANT MORTALITY UNCORRECTED. MOTHERS UNDELIVERED, STILLBIRTHS, AND NEWBORN DEATHS. JANUARY 1, 1922, THROUGH DECEMBER 31, 1937. 16 YEARS.

1. January 1, 1922, through December 31, 1927. Infant Mortality 56.36 per cent.
2. January 1, 1928, through December 31, 1932. Infant Mortality 40.24 per cent.
3. January 1, 1933, through December 31, 1937. Infant Mortality 23.81 per cent.
4. January 1, 1935, through December 31, 1937. Infant Mortality 21.87 per cent.

If we correct group (4) by omitting the patients who died undelivered and those less than 28 weeks pregnant at the time of delivery, the combined stillbirth and neonatal death rate is 12.28 per cent.

Chart I shows an uncorrected maternal mortality of 6.25 per cent for the past three years. Chart 2 shows during the same period an uncorrected infant mortality of 21.87 per cent for all eclamptic patients.

Treatment of the toxemia patient must be individualized both before and after the onset of convulsions.

An excellent review of the numerous methods of treating eclampsia was published last year by Dieckmann. I shall outline the treatment we have used for the past three years. On admission the patient with convulsions should be segregated, kept quiet, and watched constantly to prevent body injury. During the convulsion an attendant should protect the patient's tongue and lips, and remove the mucus. Elevating the foot of the bed is helpful in some cases, and we frequently use an aspirator to remove the mucus. Immediately after the convulsion oxygen is helpful until cyanosis disappears.

Control of the convulsions is attempted by the intravenous injection of 20 cc. of 10 per cent magnesium sulphate solution. Immediately following this and before removing the needle, we give 2 cc. or 4 cc. of digifolen, followed by 300 cc. to 500 cc. of 10 per cent dextrose solution intravenously. A specimen of blood for chemical analysis is obtained when the vena puncture is done, and the intravenous medication is usually started immediately, thus decreasing the number of vena punctures.

Intravenous solution of magnesium sulphate may be repeated in one hour if necessary to control convulsions, or restlessness. We limit the magnesium sulphate intravenously to 60 cc. of a 10 per cent solution in twenty-four hours. Calcium suitable for intravenous use should be available whenever large doses of magnesium sulphate are used. Digitalization may be completed by oral administration of the drug if the patient is conscious, or by nasal tube if she is comatose.

Schumann has stated that eclamptic patients usually have a dilated heart when examined at autopsy. Pulmonary edema is a common complication of eclampsia. It has been proven that digitalis leads to marked increase in cardiac tonicity and irritability, particularly of the ventricular muscle. The reverse is true of the magnesium salts. These substances are physiological antagonists as far as the heart is concerned. Therefore, digitalis should be given in large doses to overcome cardiac depression when magnesium sulphate is used intravenously. Digitalis may also have some beneficial diuretic action in these cases.

We rarely ever use morphine except when eclampsia is complicated by cardiac symptoms or pulmonary edema. Phlebotomy is also limited to this group. Many neurologists think morphine is contraindicated in the presence of edema of the brain and we believe the omission of this drug from our routine treatment has probably decreased our stillborn and newborn death rate. It seems probable that large doses of morphine may either stop uterine contractions or prolong labor when given to women having convulsions and just starting in labor. If given late in labor the baby may be difficult to resuscitate. We use pentobarbital sodium (nembutal) or sodium amytal for analgesia if the patient is restless or in labor.

Dextrose solution intravenously may be repeated every six or twelve hours as necessary. Sodium lactate should be added if the CO_2 combining power of the blood plasma is low. If the patient is conscious, sweetened fruit juices and water in liberal quantities are given orally. The comatose or semiconscious patient should not be given anything by mouth except through a nasal or a stomach tube.

We attempt to terminate pregnancy artificially only in those patients who fail to respond to conservative treatment, and those who improve under treatment, but after a few days show signs of increasing toxemia. Eclamptic patients react poorly to ether and all general anesthetics. They often deliver spontaneously without any anesthetic. We prefer local

or spinal anesthesia when operative interference is necessary. I believe Caesarean section should be resorted to in toxemia patients only when rapid delivery is indicated and the condition of the cervix and size of the pelvis predispose to a long or difficult labor.

SUMMARY OF CASES

No. 1. A. C. Admitted November 7. Delivered November 12. Died November 20. Negro, aged fourteen years, gravida i, para o, twenty-six weeks pregnant, two visits to the prenatal clinic. Admitted by ambulance, totally unconscious, and with a history of severe convulsions.

Physical Examination: B.P. 152/90, pulse 110, temp. 99 degrees. Urine: sp. gr. 1.020, heavy albumin, abundant pus, no casts. Blood: R. B. C. 3,200,000, Hbg. 65 per cent, W. B. C. 6,600. Blood chemistry: sugar 68 mg., N. P. N. 25 mg., uric acid 5 mg., plasma CO_2, 40.9 volumes per cent, albumin 3.3, globulin 3.

Treatment: On admission magnesium sulphate solution 10 per cent, 20 cc. intravenously. This was repeated in one hour, and followed by dextrose solution 10 per cent, 500 cc. intravenously. Following this she remained quiet and the convulsions stopped. During the next two days she received five intramuscular injections of 50 per cent magnesium sulphate (2 cc. each). This was alternated with sodium luminal gr. 2 intramuscularly for sedation. Patient remained quiet and gradually regained consciousness. Fluids by mouth freely.

Onset of labor spontaneous November 12 at 4:00 P. M. Low forceps delivery of a premature living male at 9:50 P. M. Nitrous oxide and oxygen anesthesia.

Temperature 103 degrees before delivery, remained elevated. Patient remained conscious until a few hours before she died on November 20.

Autopsy: Bilateral pyelonephritis. Bronchopneumonia. Splenic tumor. Ulcers of colon.

No. 2. G. H. Negro, aged twenty-three years, gravida i, para o, about forty-two weeks pregnant. Sent by private car thirty miles to Richmond. Admitted totally unconscious May 12, 1936, at 1:05 A. M. and died twenty-one hours later. Her husband stated that she had no prenatal care and had headache, edema, nausea, vomiting and loss of vision for one week, and convulsions for twenty-four hours before entering the hospital.

Physical Examination: B. P. 186/120, pulse 120, temp. 103 degrees, unconscious but restless. Foetal heart sounds not heard.

Catheterized specimen of urine, port wine color, sp. gr. 1.004, albumin, boiled solid, gross blood and many casts. Blood examination: R. B. C. 4,230,000; Hbg. 85 per cent, W. B. C. 26,150. Blood chemistry: sugar 80 mg., N. P. N. 43 mg., uric acid 11.7 mg., cholesterol 304 mg., albumin 4.4., globulin 2.

Treatment: Magnesium sulphate solution 10 per cent 20 cc. intravenously, repeated after fourteen hours. Magnesium sulphate solution 50 per cent intramuscularly, five doses of 2 cc. each, alternating with sodium luminal gr. 2 intramuscularly. Patient failed to regain consciousness and died undelivered.

Autopsy showed a full-term macerated foetus *in utero.*

Bilateral hydro-ureter and bilateral nephrosis.

Heart and liver normal.

No. 3. I. M. Negro, aged forty-two years, gravida viii, para vii, about thirty-two weeks pregnant. Admitted by a private car totally unconscious at 10:30 P. M., July 28, and died undelivered five hours later. A neighbor found her unconscious and thought she had a convulsion. She had not seen a doctor, and no other history could be obtained.

Physical examination: B. P. 230/170, pulse 120, temp. 103 degrees, respirations 35, not in labor.

No urine obtained. Blood examination: R. B. C. 4,444,000, Hbg. 88 per cent, W. B. C. 18,850.

Blood chemistry: sugar 198 mg., N. P. N. 43 mg., uric acid 6.2 mg., albumin 3.1, globulin 2.1.

Treatment: Magnesium sulphate solution 10 per cent 20 cc. intravenously, followed by dextrose solution 10 per cent 500 cc. intravenously. Nasal tube passed, gastric lavage, then digitalis gr. 9, magnesium sulphate one ounce and nembutal gr. 3 left in the stomach. She had no convulsion after admission to the hospital but failed to improve and died undelivered.

Partial autopsy showed an undelivered pregnancy.

Multiple hemorrhages in the liver.

Tubular degeneration of the kidneys.

No. 4. E. L. Admitted December 24, 1937, at 7:30 A. M. Died December 25, at 8:55 P. M. White, aged thirty-three years, gravida viii, para v, abortions ii. Admitted by city ambulance. About thirty-six weeks pregnant and totally unconscious. No prenatal care. History of headache, visual dis-

turbances and edema for several weeks. She was found having convulsions about 5:00 A. M., and known to have had four convulsions at home and two on the way to the hospital. Morphine sulphate one-fourth grain administered at home.

Physical Examination: B. P. 170/130, pulse 130, temp. 102 degrees, respiration 20. Unconscious but quiet.

Urine: sp. gr. 1.028, albumin solid, no casts, many blood cells. Blood examination: R. B. C. 5,320,000, Hbg. 110 per cent, W. B. C. 27,400. Blood chemistry: sugar 156 mg., N. P. N. 34 mg., uric acid 5.1 mg.

Treatment: Magnesium sulphate solution 10 per cent, 20 cc. intravenously, and dextrose solution 10 per cent 500 cc. intravenously. Gastric lavage and magnesium sulphate one ounce, digitalis gr. 9 and nembutal gr. 3 by nasal tube.

Patient remained quiet but failed to improve. She was given 50 cc. of 50 per cent dextrose twelve hours after admission and later caffeine and coramine. She died undelivered the day after admission.

No *autopsy.*

SUMMARY

1. Early and consistent prenatal care will reduce the incidence of preëclampsia and eclampsia.

2. The interruption of pregnancy in preëclampsia before the onset of convulsions will reduce both maternal and infant mortality.

3. After the onset of convulsions treatment should be directed to the prevention of body injury to the patient, and to control of convulsions by medication.

4. Convulsions can usually be controlled by 20 cc. of 10 per cent magnesium sulphate intravenously.

5. We usually give 500 cc. of 10 per cent dextrose solution intravenously immediately after the initial dose of magnesium sulphate.

6. Sodium lactate should be given intravenously whenever the CO_2 combining power of the blood is below normal.

7. Morphine is unnecessary and probably harmful.

8. Rapid digitalization is helpful and probably reduces cardiac complications.

9. We limit fluids to less than 3,000 cc. in twenty-four hours only when cardiac decompensation threatens or occurs.

10. Delivery is indicated only after the convulsions have been controlled or when the patient fails to respond to medical treatment.

11. The treatment outlined resulted in an uncorrected maternal mortality of 6.25 per cent in sixty-four consecutive eclamptic patients, and an uncorrected infant mortality of 21.87 per cent; fifty-two normal live babies were discharged from sixty-four eclamptic mothers.

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MEDICAL JURISPRUDENCE—THE MEDICAL WITNESS.*

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When we consider the subject of medical jurisprudence from a medical viewpoint, there is in my opinion a certain difference or contrast, when considered from a legal or other viewpoints. It is my sincere opinion, based on observations over many years, that the average doctor, however proficient he may be in his usual professional capacity, does not measure up to his usual standard of efficiency, when called upon to testify in Court. The end-results are that not infrequently misunderstandings arise, which tend to thwart the great goal of *justice*, which is, I

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am sure, and by every right should be, the mutual objective of all parties concerned. And, furthermore, the effect of these misunderstandings on juries, and more especially on the spectators present, is far from what one might desire, in order that the efficiency and dignity of the Courts may be properly upheld.

It would appear to me, therefore, that a great good may be accomplished, at least from a medical viewpoint, by meetings of this type, where we may come to know you members of the legal profession, in a friendly, social gathering, contrasting rather definitely as it does, with our usual relationship in Court procedure. It is truly an instance where the trite saying, "Where ignorance is bliss, 'tis folly to be wise", does not apply. I truly believe that the majority of attorneys stand somewhat aghast as they listen to medical men express different opinions about a given case, and fail utterly to understand why they should differ, when as a matter of fact we physicians are inclined to think there is never more difference of opinion anywhere in the world than among the members of the legal profession, as we listen to your comments and discussions in the court room. So it really does appear to me that a better understanding of each other's ideas and problems might at least be of some help.

That a certain amount of *fear* based upon ignorance and misunderstanding tends to dominate the mind of the average medical witness in Court, is in my opinion a statement of *fact*. That everything that will help to alleviate this fear, whether from ignorance or misunderstanding, would be productive of good results is again in my opinion a statement of *fact*. The general opinion of the average medical witness, when he takes the witness stand, and an oath to tell the *truth*, the whole *truth*, and nothing but the *truth*, and has finished testifying, seems to be that, while one attorney is trying to bring out the truth, another on the opposite side is trying equally as hard to keep the *truth* from being brought before the jury and Court. And all due in my opinion from failure to properly understand Court procedure, or the fundamentals of difference between handling a sick person, and handling a case in Court. The unveiling of *truth* is the only means by which real justice can be brought to light—a premise in which we of both professions are vitally and I am sure mutually interested, and one in which we of both professions are to a certain extent ignorant of the other's viewpoint. So it will be my endeavor from a medical standpoint to outline to you of both professions some of the impressions and reactions of the average doctor, from his medical school experience, up to and through the time he receives a summons in Court, takes the witness stand, and testifies under oath as to his knowledge or opinion of the particular case under consideration, based upon my own experiences and mistakes as a medical witness.

Most people, including attorneys at law, I believe, are rather inclined to think the amount of time we take in preparation for the practice of medicine, should be amply sufficient for the *average intellect* to know a great deal more about medical jurisprudence and any other subject taught in a medical school, than as a matter of fact we really do know. In this assumption they are probably correct, because certainly it is not customary among medical men of my acquaintance to make many 100 per cent grades on the subjects studied in school. The statement that our education in medical schools on the subject of medical jurisprudence is not only very limited, but at times faulty and defective, may come as a surprise to members of the legal profession, yet I am sure it will not be challenged or denied by the members of the medical profession, unless it be *the faculty member* who stages the brief course for medical students on this important subject. In fact, about all we medical men know about medical jurisprudence "is what we read in the papers", or what we learn at your hands, trying to testify in Court, and this at times to our rather severe embarrassment and sorrow.

One of the first and most embarrassing experiences I ever had on the witness stand came about as a result of a statement made in one of our textbooks on medical jurisprudence—namely that a medical man cannot by any process of law be compelled to testify as an expert witness, unless he so desires, or is willing to do so. I quite well remember the argument between an attorney and myself on this point. We both thought we were right until the late Judge Moffett explained that the law was different in our several states, but that in Virginia a medical man could be summoned and forced to render expert testimony, whether he wanted to or not, but that the right of compensation was a privilege of the expert medical witness, to be mutually agreed upon by those parties interested or determined by the Judge of the Court. Had my fundamental education been more complete along this line, I would certainly have been spared an embarrassing experience, and I believe

also the attorney in the case. Dr. Beverley R. Tucker, a prominent specialist of Richmond, and a man of wide experience as a medical expert, and professor of Neuro-Psychiatry, Medical College of Virginia, in an address delivered before the Seaboard Air Line Surgeon's Association in Miami, Florida, December 5, 1935, and at the Atlantic Coast Line Surgeon's Association in Charleston, S. C., April 7, 1936, on page three of his address, makes this statement: "You can be called as an ordinary witness and be made to testify, but you cannot be made to testify as an expert witness, unless you wish to do so." This statement is also made by other teachers as well as authors of books on medical jurisprudence, which will explain the above statement that our fundamental education is in my opinion at times apparently faulty and defective. Who is right? It is my opinion that Judge Moffett's ruling is correct and the other's necessarily wrong, and until the Supreme Court of Virginia changes a Judge's ruling or decision, the same decision has the force of law.

That we medical men are rather inclined to take matters of difference between the two professions in court more seriously than the attorneys, is again in my opinion true in the majority of instances. That the answer—"I don't know", which we so often hear from a medical witness, is indeed and in truth a statement of *facts* in the case, is in my opinion sometimes misunderstood by an attorney as an unwillingness on the part of a physician to try and intelligently answer a question. My observation is that very frequently a medical witness rather than admit his ignorance publicly, tries to answer questions, that right down in his heart, mind, and soul, he really knows that he does *not* know the answer.

Again, because of the many things, such as jury service, etc., that we medical men are exempted from, because of the very nature of our duties and obligations, it seems to me that we are rather inclined to forget that there are certain duties and obligations we owe to society as citizens, such as the subject at present under consideration. One of the outstanding *defects* of the medical profession today is, in my opinion, a failure to properly build up a good medical, professional *collateral,* in the communities and states in which we live, along this very line of thought.

I feel that the medical profession should have the idea thoroughly impressed upon their minds, that to render any act of citizenship, whether in court or elsewhere, is just as important and necessary in our profession as elsewhere in life.

Secondly, a properly prepared and well-trained medical witness need not only have nothing to fear in court, but, on the contrary, his experience there may also serve as a pleasant introduction in a community (advertisement if you care to thus describe it) that does not cost him a cent and for which he cannot be accused of so-called *unethical conduct.*

Thirdly, failure to properly familiarize ourselves with the subject upon which we will be examined in Court is another great fault. Desiring to get through with this trying ordeal as expediently as possible, medical witnesses frequently make the fatal mistake of not giving the proper amount of study to the subject, with the result that their experiences on the witness stand give them a rather unfavorable advertisement. It is not only the duty of citizenship to answer a summons *promptly,* but a question of duty and courtesy to our Courts to go on the stand well enough acquainted with the subject to give intelligent answers to questions, whether the answer is *yes, no,* or *I don't know,* and, above all, to properly distinguish between *opinions* and *facts.*

I doubt, if you would ask the average doctor for a definition of a "dying declaration", and grade the answer in a legal way, if the grade would be much over 10 per cent. For the most part we appear to overlook the fundamental legal idea of a dying declaration being a belief on the part of the person making it that, at the time of such statement, he or she thinks they are in immediate danger of death. And it makes no difference what the physician or anyone else thinks of the patient's condition, as a pre-requisite for such statement to be admitted in Court as evidence. I believe this is fundamentally and legally correct.

Fourth:—Insincerity. As far as I have been able to discern, this is not a usual thing among medical witnesses, and in all sincerity I truly believe it is less common than perhaps a great many people think. When a physician takes the witness stand and testifies that in his opinion a certain person is *insane,* this information becomes a batter of public record. But the public knows little if anything about the many other cases concerning which we are consulted in private, and concerning whom we express the opinion that the person is *sane,* for the very obvious reason that we are generally not called upon to testify in this class of cases.

Reactions to Summons:—When a physician re-

ceives a summons to testify in Court his first reaction appears to be to "see red," so to speak. Probably because of his professional obligations to some one who is real sick,—I wish here to record the fact that I have never yet and never expect in the future, to know of any case of this type that does not receive the most gentle and humane consideration from everyone officially connected with a Court procedure,—maybe from fear because of ignorance of the case, or unwillingness to take the necessary time to prepare for his testimony, or lack of acquaintance with the legal set-up in a Court room, or on account of the unusual surroundings in which he finds himself placed. The physician is in the habit of examining patients and discussing their troubles in the privacy of his office or sick room, with the usual attendants, which are always very limited in number. When he is suddenly, and also rather infrequently, placed in the publicity of a Court room, the contrast to the physician is more marked perhaps than you gentlemen of the Bar Association might think. I have seen many physicians or surgeons who were really *masters of their arts* in the examining or operating room, act like timid school boys on the witness stand, even with many years of experience. Why? I truly believe the answer is largely due to lack of familiarity with affairs in Court room, plus an emotional mental disturbance (stage-fright), as a result of the contrast between the sick room and the Court room.

On the Witness Stand:—With the foundation, as above outlined, we are now ready to take the witness stand. Above all other things, be *prompt* in attendance, as your first answer to a court summons, not only as a matter of ordinary courtesy, but also as a matter of assistance and helpfulness. If impossible to be there on time, extend the same courtesy of notification to the courts as you would to the most important social engagement—RSVP. Most of us answer questions on direct examination much more readily than we do on cross examination. Why? In the first place we generally have had an opportunity to discuss the case at hand with the attorney who directs the initial examination, or at least are generally acquainted with him, and the general line of questions he asks. Not so, however, with the person conducting the cross examination. A failure to have at least a fundamental idea of the general principles underlying the two types of questions frequently brings about hesitant answers on cross examination from a medical witness, who has been quite the reverse in answering the direct examination. Or it may be a type of question that is difficult to answer, such as one I heard asked in Court on cross examination, not so long ago, purely in the form of jest: "Doctor, what is electricity"? The physician, being unable to answer, was told rather promptly to "stand aside". This particular physician was rather irate, failing entirely to grasp the humor of the question, which was in the mind of the attorney at time question was asked. A darkey on the witness stand, hesitating on each and every question, when upbraided by the Court for such slow answers, is said to have told the Court that he could not *talk like attorneys* without thinking. The end-result of the whole procedure is to leave the impression of *partisanship* on the part of the witness, which is, I believe agreed to by all of both professions, a *most unfortunate thing*. If we could only realize the importance of familiarizing ourselves with the subject under consideration, and extend the same genuine courtesy to counsel on either side, (the same alike), what a difference there would be in the general impression on the jury and spectators! Don't forget that you as a witness cannot be forced to answer all questions *yes* or *no;* also remember that the question as to whether a person is "drunk" or not is a very relative question (ill,—jocose, etc.,—blood-test).

Then, again, it is important to talk in plain, simple, understandable language. We medical men have to do a lot of translating in our conversations with our patients and for the most part do it very nicely, I believe, but when we get on the witness stand we seem to lose all sense of relationship, and, instead of saying that a person has an inflammation of the inner lining of the heart, we prefer to say he has an "endocarditis". Of course, this sounds rather big at first, but what idea does it convey to the jury? Or we may say osteo-myelitis for bone inflammation; arterio-sclerosis, for hardening of the arteries; pneumonitis instead of pneumonia; neuritis instead of an inflammation of the nerve; meningo-encephalitis instead of inflammation of the brain and membranes. Or instead of saying the small muscle that raises the upper eyelid, we prefer to say the levator palpebræ; or, the most inexcusable of all, instead of describing a small muscle that lifts the upper lip and opens the nostril in front, we call it, one of the smallest muscles in the body, by the unfortunate name of levator labii superioris alæque nasi, and feel perfectly satisfied that we have acquitted ourselves nicely, when,

as a matter of fact, I believe the jury sometimes thinks *we ourselves* should be *on trial* rather than the person being tried. Always avoid quoting textbooks as far as possible and remember *you* must be your *own* authority on questions of expert opinion.

Again, we sometimes permit ourselves to lose our temper or rather become fretted, which is the worst thing that can happen to any witness; and this more often through the inability to understand fully the whys and wherefores of the entire procedure. Our inability to distinguish between opinions and facts is most unfortunate at times. We frequently make the mistake of testifying as to hearsay evidence, as I myself did accidentally or unthoughtedly not so long ago in our Court here, and was very promptly reminded by one of the attorneys of the error. It is really *surprising* how *little* any of us really know, and *how much* we *think* we know, because we fail to distinguish between our *opinions* and *facts* in a given case.

Ordinary vs. Expert Testimony:—A proper distinction between ordinary and expert testimony appears to be another stumbling stone for most of us, and sometimes it appears to me rather difficult for one to determine where one stops and the other begins. If it is true that a medical witness is entitled to compensation for expert evidence, and he certainly is not for his ordinary evidence, then these are matters that should best be settled before going on the witness stand, rather than argue such questions before a jury or spectators. I believe there is a definite difference of opinion in the minds of the average attorney and the average physician on this point. From a *medical* viewpoint we are inclined to the idea that *few physicians are expert in anything;* if any of us are entitled to this most complimentary term, we would rather be inclined to refer to the *specialists* as experts rather than to the general practitioner. From a legal viewpoint, it would appear that you gentlemen refer to expert testimony as that evidence given by *anyone efficiently* and *pecularily trained* and *educated* along any *particular* line,—not that he has to be a specialist or expert among his fellow members of his particular profession, but rather *expert as compared to those* not *educated or trained* along that *one particular line or profession.* I believe this is approximately correct from a legal viewpoint. If not, I will be glad to be enlightened on the subject.

An attorney said to me once that one thing most lawyers could not understand was why doctors differed so frequently in their opinions in a given case. My answer was the "story of the blind men from Hindustan and the elephant." Take, for instance, insanity: sanity means sound mind; insanity means unsound mind. Degree of unsoundness determines knowledge or ignorance of the question of right or wrong in any given case. In all probability a big majority of all criminals, and probably 100 per cent of all *chronic* criminals, have at least some mental unsoundness. Criminal responsibility depends therefore upon a percentage degree, and is in my opinion one of the most difficult questions to answer, either from a civil or criminal viewpoint. There are many forms of insanity and the big majority of them vary from time to time. For instance, *periodic alcoholic insanity*—clear today, cloudy tomorrow. Then, too, the impossibility of getting the same history or the same reactions from the same patient at different times. Also the limited time frequently available to formulate an opinion by a careful study of the case. Here again the specialist comes in for his superior knowledge of this kind of work and which I believe is recognized by the laws of the Commonwealth of Virginia. Thus if we say in a hearing on a commission of insanity that in our opinion a person is insane, and send him to a state institution, the superintendent may disagree with us, and the courts appear to or are supposed to stand by his decision, rather than the opinions of the two physicians of the commission. We probably study the case a brief few hours, while the superintendent of one of our mental institutions will probably take several months of daily study and observation before formulating an opinion.

The words probability and possibility, when involved in a question, appear often to be a rather confusing problem for most medical witnesses. We seem to be inclined again to overlook the distinction between opinion and fact, and also that the word probability would suggest a high percentage idea and the word possibility a low percentage, but, nevertheless, the possibility idea is a percentage of *fact.* A most careful study and analysis of every question asked on examination is of the utmost importance, for, otherwise, it is very difficult to make one's testimony compatible throughout. Yet how often do you notice a medical witness attempt answer, with little if any consideration of the real purport and meaning of the question asked!

That medical opinion can be bought with a price, no one can satisfactorily deny, at least at times, any more than human opinions in other vocations and professions. That this practice is frequent is, in my opinion, not true, for, from a careful observation over many years, I have yet to know of an instance that would cast the slightest suspicion on any medical witness that it has been my privilege to confer with incident to any case. However, we must frankly admit the possibility, face the facts and do all in our power to correct this most infamous of all acts incident to medical testimony.

Now, in conclusion, may I again remind you that most of what I have said is a question of opinion and not necessarily a fact. I hope with you that, from a mutual consideration of the subject of medical jurisprudence, both professions may not only be enlightened and benefited, but that humanity in general may profit by our experiences. For, as Dr. Beverley R. Tucker once said—"Upon the proper understanding of medico-legal problems, much of the happiness, justness and prosperity of the race depends."

DIAGNOSTIC METHODS WHICH HAVE SERVED ME BEST IN DETERMINING SINUS DISEASE AND SO-CALLED HAY FEVER.*

E. TRIBLE GATEWOOD, M.D.,
Richmond, Virginia.

During the past decade there has been an increasing demand by the public for a complete medical examination by a single consultant. This desire coupled with a lack of interest in the use of certain diagnostic aids by some rhinologists has caused a number of internists and general practitioners to equip themselves for making their own sinus diagnoses. It is with this fact in mind that I wish to discuss some principal points which are often confused when determining sinus conditions.

Several years ago sinus disease was little discussed, incorrectly diagnosed and poorly treated. As a rule, the nasal passages were accused and punished for most of the disorders originating in the sinuses. However, there are many sinus cases today which are receiving urgent treatment to their nasal passages when their sinus cavities are receptacles of pus.

The ability to recognize and differentiate nasal symptoms from sinus symptoms is all important. This may not be done in every case because there are certain conditions which are interrelated and definitely dependent upon each other. Nevertheless, most cases can be properly analyzed so that appropriate treatment can be rendered and better results obtained. The term, "sinus infection", as a diagnosis is too generally accepted and recorded as a specific condition. One should endeavor to state which sinus or group of sinuses is involved and the type of pathology existing in each. This may seem unnecessary to the casual observer but, if the disease is to be treated properly, this information is absolutely necessary. For example, an acute frontal sinus empyema may do well under one form of treatment while, on the contrary, if it were chronically diseased with polypoid granulations, similar treatment would make it infinitely worse. Then again, a recently developed maxillary empyema will usually respond to a few irrigations, when it is more often a waste of time to continue irrigating a cavity partially filled with chronic pathology.

As sinus infection is one of the most potent factors in the production of systemic diseases, it has become necessary that the internist know the exact condition of these cavities before summarizing his general medical examination.

We are all aware of the importance of an accurate history in general medicine and it is just as applicable to sinus conditions as it is to other types of disease. A negative sinus history however, may be misleading. This has been proven to me on numerous occasions by making further objective studies. In other words, we have had patients with chronic sinus disease state that they never had colds, sore throat, nasal obstruction, headache, pain, etc., yet, upon further examination, very definite disease was found. Pain is looked upon as a prominent and constant symptom of sinus disease by the laity. Our records show that pain was frequently present in acute cases though infrequently present in chronic

*Read at the sixty-ninth annual meeting of the Medical Society of Virginia in Danville, October 4-6, 1938.

cases. All of us are familiar with the miscellaneous pains about the face and head that are usually attributed to sinus disease. This is especially true of neurotic individuals and those in the realms of domestic conflicts. Sinus disease is not unpopular and it is oftentimes accepted as a satisfying defense mechanism. Good is the doctor who can sense such functional reactions and direct the unfortunate to those more capable of giving proper treatment.

When the frontal sinus headaches exist they are usually worse upon rising in the morning, gradually improving through the day. Maxilliary sinus headaches are also located over the frontal region but they rarely improve through the day. Sphenoidal headaches are more or less constant and are referred to the occipital region. Ethmoidal headaches are inconstant, in nature and location. Irritability, fatigue and inability to concentrate comprise a "triad" which is frequently associated with any form of sinusitis. Deafness is so commonly caused by chronic sinus disease that it may be regarded as a classical sequel to this affection. The association of sinus disease with bronchitis and bronchiectasis needs no emphasis. More often than otherwise attacks of sore throat may be regarded as an acute pharyngitis secondary to chronic sinus discharge.

Symptoms of so-called perennial hay-fever have so frequently proved to be due to infection of the antrum in my experience that I rarely have to resort to other methods of investigation. It would seem that in many of these cases of infection, the nasal mucosa becomes secondarily swollen and hypersensitive to the purulent secretion that sets in motion the mechanism of sneezing. There are also other patients with maxillary empyema who have no sneezing symptoms whatsoever until the pollen season arrives. Then the pollen super-imposed upon an inflamed and irritated nasal membrane produces typical hay-fever symptoms, which can seldom be improved by pollen immunization alone. The basic cause should be removed instead of directing attention to the superficial exciting agents. Do not misunderstand, for I am aware of the allergic factors which may be the primary cause of sinusitis in some instances, and the advisability of making nasal smears, leukopenic counts, skin tests and tissue examinations before treatment is instituted. However, my experience has led me to believe that they are largely in the minority if more of the proven and accepted methods for diagnosing sinus infection are given first consideration.

Not infrequently antral disease in children is contracted from parents very early in life and remains unrecognized until more exaggerated symptoms are occasioned by some exciting agent such as swimming or until a definite bacterial allergy has developed. Early sinus symptoms in children are not entirely like those of adults, as a number of these patients may manifest no symptoms other than "stomach upsets" such as abdominal pain, nausea and vomiting. These symptoms are so similar in some instances to attacks of acute appendicitis that a nicety of diagnosis is required. Certain acute attacks are masked by complications such as severe cough, otitis media or asthma. The chronic type of sinusitis in children may produce recurrent attacks of sore throat, enlarged cervical glands and malnutrition. These are the cases which are likely to lose their tonsils, with little or no subsequent benefit. Quite frequently in older children fatigue and inability to learn satisfactorily at school are also outstanding symptoms of this form of infection.

In general, then, a positive history properly evaluated should make possible a probable sinus diagnosis. Inspection of the nasal passages before and after shrinkage should be of diagnostic help. Gently applied suction may aid in the discovery of pus from the frontal and ethmoid sinuses, though its use is of no value in aspirating pus from either the antrum or sphenoid. Palpation may elicit tenderness over an acutely infected frontal sinus but its use otherwise is of little value. The ethmoid and sphenoid are protected and the antrum is infrequently involved to the degree of external tenderness.

Transillumination is a widely used diagnostic method by general practitioners and specialists with some benefits. Much in its favor is its simplicity of use and economy of operation. The unfavorable factors are chiefly predicated upon anatomical variations which exist in the sinuses. We all know that there are few subjects whose frontal sinuses are alike in size and shape. For these reasons alone the evaluation of comparative shadows cast through these particular cavities is made worthless. The sphenoid and ethmoid are too inaccessible to attempt a reading. Transillumination develops its greatest usefulness in the examination of the antra. These cavities as a rule are alike in size and shape and therefore a unilateral shadow may be interpreted as pathologi-

cal. On the contrary, a bilateral shadow would prove nothing, as bilateral disease is no more capable of producing dense shadows than thick anatomical structures. It would seem then that transillumination is most helpful when used at a time when there happens to be a unilateral antral involvement.

Irrigation of certain sinus cavities has proven a diagnostic sheet-anchor in many cases. In most instances, this is the only positive method by which a sphenoid may be diagnosed. Irrigation is of no value in diagnosing ethmoid conditions. It may be helpful, however, in determining if infection is present in the frontal sinus when other methods have failed. Not every diseased antrum is a receptacle of pus, and a negative washing does not necessarily mean a non-infected antrum. We have had this experience when the existence of polypoid granulations approached antral capacity.

Roentgen ray of the sinuses is not always dependable even when the best technic and interpretations are followed. It should be looked upon and used as a helpful laboratory aid and not as a complete diagnostic method. The reason for this is that films taken of atrophic cases of sinusitis are not unlike those taken of normal sinuses. Again there are many border-line cases that cannot be diagnosed without making use of clinical data as well. Every rhinologist should be as well versed in the interpretation of sinus films as he is in the interpretation of clinical data. Personal interpretation of sinus films correlated with case histories and clinical findings has convinced me that it is hazardous to venture a definite sinus opinion without enlisting X-ray help. Pathology of the frontal and maxillary cavities is much more readily demonstrated on sinus films than that of the ethmoids and sphenoids. Frequently the roentgen ray is worthless when a sphenoid diagnosis is concerned. However, it does give a good definition of the anatomy which is helpful if an operation is contemplated. Correct interpretation of ethmoidal films is exceedingly difficult. The exact position required, variations of the anatomical structures and the delicate pathology that may exist require unusual consideration. Shrinkage or irrigation of the sinuses immediately before X-raying a patient should always be avoided. While certain types of sinus operations do not affect subsequent roentgen ray examinations, there are others that render roentgen ray opinions entirely worthless. In certain cases of sinus disease it is desirable to know more about the character and amount of pathology existing in a sinus than can be gained from plain sinus films. In this event, iodized oil injected into the affected cavities immediately before having the patient X-rayed will usually produce films of a more decisive nature by better outlining the pathological process in question.

In conclusion, sinus disease in general is not difficult to recognize. Yet, in order properly to treat this infection, the individual sinus or group of sinuses should be determined and visualized so that a fair knowledge of its pathology may be gained. Failure to do this may lead to misdirected nasal operations or elaborate tests with prolonged treatments for nasal symptoms which are essentially sinus in origin.

Professional Building.

DISCUSSION

DR. THOMAS E. HUGHES, Richmond: Dr. Gatewood's paper has been read with much interest. He has made some observations on the diagnosis of sinusitis that deserve our careful consideration.

In making a diagnosis of sinusitis and allergic conditions, it is essential to elicit an accurate history from the patient, to make a careful inspection of the nasal and oral cavities, and to invoke the aid of all laboratory facilities at our command. Transillumination, X-ray, suction, smears of mucus from the nasal cavity, leucocyte and differential count, cultures from the sinuses, etc., are helpful diagnostic aids.

In taking the patient's history, it is important to find out how long his symptoms have existed, whether he is subjected to colds or grip, when he has had his most recent cold, if his parents or other members of his family have allergic attacks. If the symptoms have been present since childhood, the probability is that he inherited an allergic tendency, though the possibility of sinusitis since childhood must not be overlooked. On the other hand, if the symptoms have developed rather acutely and recently in an adult, infection of the sinuses is the more likely diagnosis.

A history of difficult nasal breathing, in the absence of an anatomical obstruction, associated with frequent colds, post-nasal drainage, recurring laryngitis and sore throat, chronic cough or bronchitis, are very suspicious symptoms of sinusitis. Pain may or may not be present; nevertheless, I believe that pain is present in some stage of most cases of sinusitis, though many times it is masked by some other more severe symptom. For example, a patient with grip might have a slight pain in one or more sinuses and not attach sufficient importance to it to recall it a month later.

Sometimes lassitude and a tendency toward fatigue are the only symptoms of which the patient complains. There may be no pain, nasal obstruction, pus in the nasal cavity nor any other symptom referable to the nose, and yet, there may be pus confined in a sinus cavity. Several years ago, a young woman was sent to me by an internist

for examination. When asked her complaint, she said that she had been sent for a nose and throat examination, and that there was nothing wrong with her nose or throat. Her only symptom was lack of energy. However, after sinusitis was diagnosed in one maxillary sinus, the infection was treated and she promptly regained her normal health and vigor. Transillumination is a good laboratory aid in a unilateral maxillary sinusitis, though of less value when both sides are involved and of no practical value in any of the other sinuses. When a patient uses a dental plate, transillumination is not to be relied upon in diagnosing maxillary sinusitis, as friction from the plate produces enough thickened tissue in the mucous membrane of the hard palate to interfere with transillumination.

Suction is of some value in diagnosis of maxillary sinusitis as well as other sinusitis if a simple principle of physics is observed. Due to the anatomical structure, the frontal and ethmoidal sinuses, whose outlets are at the bottom, are more easily aspirated than the maxillary sinus whose ostium is located above the level of the floor of the sinus; therefore, after using suction with the patient's head erect, tilt it to the left shoulder and slightly forward when evacuating the right maxillary sinus, and to the right shoulder to empty the left maxillary sinus. In these positions the maxillary ostium is at a lower level than when the head is in the erect position.

Radiography offers the greatest aid of any of the laboratory facilities in diagnosing sinus conditions. With the X-ray, we can obtain information as to the size of the sinuses, compare the amount of cloudiness in the various sinuses and with the use of iodized oil find out whether or not the infection is chronic. With iodized oil in the sinus when the picture is made, the thickness of the membrane, polypi and cysts can be demonstrated.

The X-ray is of little value in differentiating sinusitis from allergic reactions, inasmuch as the mucosa of the sinuses is swollen in both conditions, which produces a cloudy picture. For this differential diagnosis, it sometimes becomes necessary to use the skin test—scratch and intradermal—and to examine the nasal mucus and blood for eosinophiles.

The importance of correct diagnosis and proper treatment of sinusitis cannot be overestimated. In many cases it is the means of avoiding chronic pathology.

SOME PRACTICAL CONSIDERATIONS OF THE SINUSES.*

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Probably the first authentic case on record of a person with nasal trouble being actually cured is to be found in Egyptian History, when in 3500 B. C. Sahura, the King of Egypt, had erected a monument to his physician, who had relieved him of some nasal trouble. No mention is made of the nature of this disease, nor are we told as to whether or not this gesture was from gratiude, or from the rarity of such a cure.

For 5,000 years, history is silent as to any other cures of nasal troubles, but it does tell us that in the fifteenth century A. D. all of the nasal sinuses were definitely located by an Italian by the name of Berangar. In spite of this work, these structures were allowed to sleep unmolested for another 400 years, when in 1882, Zuckerkandle brought them again into prominence by means of his scientific work. Since then, from the amount which has been both written and done to these sinuses it is doubtful whether or not they will ever be allowed to go back to sleep again. With all our knowledge of these structures, it has only been within the past ten years that we have begun to think of these sinuses as integral parts of the whole body, rather than as disassociated and separate cavities, located in the head, and which, when diseased, could be cured only by opening and draining. That the sinuses should have suffered many things of many physicians is not a surprise, when we consider that here were cavities which when diseased contained pus, in easy reach of the operator, and as they had no known function, they were left without anyone to plead their cause. Functionless structures are the true step-children of the body.

In order that we may better understand these structures we should first consider the nose, which has been called the "show window" of the sinuses. When we realize that the mucous membrane and blood supply of both is the same, it is hard to think of changes taking place in one, without these changes being made manifest to a certain extent in the other.

Inside of the nose are the three turbinate bones, which are situated on either side of the dividing partition, or septum. As these bones help to heat, moisten and strain the inspired air, functions which have a very definite bearing on the condition of the sinuses, they therefore must be carefully considered

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in dealing with sinus troubles. The sinuses which give us the most trouble are those which enter the nose just under the middle turbinate bone, and hence it is most important that we should pay particular attention to this region, if we would prevent trouble from getting into these.

With exception of the vestibule of the nose, the rest of the nasal cavity and the walls of the sinuses are all lined with the same type of ciliated epithelium, a structure which plays such an important part in the prevention of sinus infection. In dealing with this ciliated lining, the old paint slogan is very applicable, "Save the surface and you save all", for healthy cells, in a healthy mucous membrane, seldom become diseased, and if the cilia are on the job the sinuses will not become infected.

In order that they may function normally, these cilia must be bathed with a moist serum which comes up from the glands below, and when they are neither too wet nor too dry, they have a more or less sweeping motion like a field of wheat being blown by the wind. This ciliated action is capable of causing germs to be kept in motion, until they are swept out of the sinus opening into the nose and from the nose into the post-nasal space. Inflammatory conditions cause an increased amount of serum and exudate to be poured out, and this may produce a water-logging of the cilia so that they cannot function normally. When this condition of stagnation continues for a long time, a complete destruction of the cilia may take place with bad results to the membranes. When from congestion, the openings of the sinuses become closed, the cilia cannot clear out the sinuses, and hence the ventilation and drainage is interfered with. When this occurs, we must do what we can to remove this handicap, and save the surface of the lining walls of the sinuses, if we would prevent a permanent injury.

Since the sinuses are normally sterile, how does this infection so often get from the nose through these well guarded openings into these sinuses? It is thought that during inspiration, coughing, diving, sneezing and blowing the nose very hard, germs are often sucked into the sinuses, and if at the same time the vitality of the mucous menbrane has been lowered, by some general systemic disease, such as influenza, the stage is set for a true sinus infection.

Whereas most cases of sinus trouble are caused by extension from the nose, still some cases of antrum trouble are caused by extension from a carious tooth, the root of which pours its poisons in the floor of the antrum.

Since the world has become sinus conscious, many patients are coming to us with conditions which they think are from the sinuses, but which, on examination, we find are in no way connected with them. Many of these patients not only come with their self-made diagnosis as to the sinus involved, but they often request the type of treatment which they prefer us to give them.

Many cases are quite easy to diagnose, but on the other hand there are cases, which are so obscure and the symptoms so indefinite, that it is only after the most thorough examination and pains-taking history, that we are able to exclude the sinuses as factors in the patient's trouble. This so-called latent type may give few definite symptoms to help us in our diagnosis. There may be a greater susceptibility to colds, at which time there is often a sinus flare-up, and at the same time some systemic symptoms may appear. Between colds there may be few symptoms other than a slight nasal discharge or post-nasal drip. As a rule there are indefinite pains about the temporal region or eye walls, with the complaint that they have a "bad feeling" in the head, and that they tire easily.

The general symptoms of the ordinary case of sinusitis are too well known to require much attention at this time, for nearly all of these patients complain of nasal secretion, pains in the head and obstruction in the nose and, unless we can cure them of these three, we have not done them any good, from their point of view.

In the case of children, they do not come but are generally dragged to our offices because of their frequent colds and their inability to breath through their noses. They generally have a mucous discharge from the nose instead of the purulent type found in adults. In fact the symptoms are not unlike those we associate with a child with diseased tonsils and adenoids —underweight, restlessness, no appetite, poor color, possibly some systemic manifestations for which we can find no other cause.

Many observers have pointed out that often cases of chronic sinusitis in later life have been caused by the changes which took place in the lining walls of the sinus in childhood, but which went unrecognized until they were permanently impaired.

If we have been able to tell that the child has a true case of sinus trouble, what can we do to cure it

and, after we have cured it, how can we prevent it from becoming reinfected?

In the case of children there is little that we can do in the way of local treatment until we can get the cooperation of both the parent and child. Probably the most important thing to do at first is to take a most careful history, finding out all we can about the home life of the child, for in building up mucous membrane resistance and immunity against colds, a knowledge of the hygienic conditions of the child's home life is most important.

Since every "bad" cold a child has probably affects the sinuses, it is most important that we do all we can to keep them from having colds, and if they should have colds, we should do what we can to stop them as soon as possible. A nasal cold in a child who has, or has had, a sinus infection, is a very different thing from a cold in a normal child.

Since "bad" colds and acute sinusitis are almost the same in children, and since the treatment of a cold is a subject with which you are all quite familiar, I will spend no time on that. There are, however, some general suggestions I would like to leave with you in regard to the treatment of the child who has a susceptibility to upper respiratory infections.

There is not much being said today about the danger of diseased tonsils and adenoids in children, but these are factors which we must never overlook in this type of child.

Much can be done to help these children in our office and home treatments, but we often fail in this because of something this child is being allowed to do at home, which is helping to keep his general body resistance low. It may be that the child has a parent who wants to harden him by forcing him to sleep on a cold sleeping porch or take cold showers, when he does not properly react after them.

We must see that he has a well-balanced diet which is rich in Vitamins A and B, and as the alkalinity of the blood and urine of all cases of sinus trouble is low, we should push our alkaline foods.

Toxins in the gastro-intestinal tract must be watched. Find out all we can about any allergic tendencies or endocrine disturbances. Many of these children are helped by small doses of thyroid extract. The restriction of salt is often important, and at the same time the giving of calcium may be indicated.

The question of swimming and especially of diving is one which must be most carefully watched and forbidden.

The form of exercise these children take is very important because over-exercise is very bad for them.

Ask about their clothing, whether they wear a hat or thin underwear in winter, whether they wet their hair and go out immediately afterwards. Do they sit in wet shoes or wear very thin-soled shoes?

These are some of the things we must consider in the general treatment of the sinuses, but in addition we must not neglect our local treatments. Since most all sinus conditions arise in the mucous membrane of the nose, and since we know that the sinuses which most frequently become involved open just under the middle turbinate bone, this is the part which should be most carefully treated.

The promiscuous use of sprays and drops is to be condemned, for it has been demonstrated that many of these oils do no good to the nasal mucosa, but may produce a lipoid pneumonia. What we expect from our local applications is the shrinkage of the nasal mucucosa without interference with the ciliary action, and the opening up of the ostia of the sinuses, so that we will have good ventilation and drainage. The placing of a small pledget of cotton, saturated with a weak solution of ephedrine, under the middle turbinate bone, followed by a slight amount of suction with a Sonderman suction bulb, often helps to open the ostia so that the sinuses can empty themselves.

I also feel that a few drops of ephedrine in an isotonic salt solution instilled into the nose about three times a day does much to prevent the nasal congestion and make it possible for the child to clear his nose better.

Time does not permit me to go into the many forms of surgical treatment which often become necessary after our conservative form has failed, nor can I discuss what has been done in the cure of these cases with the X-ray, but I have tried to bring out some conservative form of treatments which will help us with those patients who have no chronic conditions, but who are constantly being troubled with upper respiratory infections.

In conclusion, I would like to stress the fact that the question of sinusitis is one which has many sides to it and which requires the cooperation of us all, if we are going to do what is best for our patients.

None of us today wishes to do radical surgery on sinuses, and it is only by close cooperation and the careful and prolonged treatment of the type of child

of which I have been speaking that we can hope to keep them from getting into the condition where only surgery can cure them.

Medical Arts Building.

DISCUSSION

DR. W. WALLACE GILL, Richmond: With most of the paper I agree, but before I start my discussion I wish to say there are two things I decry. One is the giving of cathartics in the beginning of a case of sinus trouble. I think recent investigations have shown, in several hundred patients at University Hospital in whom the use of cathartics was alternated as they came in, the patients being kept in the hospital until the fever subsided, that in those who received cathartics the duration of fever was actually longer than in those who did not. Of course, I think that, where children have been to a fair or a circus or something like that and have overeaten, cathartics are of value.

Another thing—I do not believe altogether in suction. You are likely to spread the trouble because of vacuum affecting normal as well as diseased chambers.

In recent years the term sinus has assumed the role which formerly was played by the term, catarrh, that all embracing alibi of a time now past. Any head symptom or combination of symptoms is now "sinus", the word so used conveys about as much as catarrh did. Until a cause for the manifestation of changes in the mucous membrane of the nose and its extensions is known, there can be no adequate treatment; and, as few cases of sinusitis arise from purely local causes, so will few cases be benefited by purely local treatment.

In the majority of the cases, the local manifestations are only a barometrical record of a general systemic disturbance and it is no use tampering with the barometer as a remedial measure. Again, in the old days the physician looked at the tongue as a diagnostic aid, but when he found a coated tongue he did not prescribe a mouth wash to cure the gastro-intestinal disorder. The nose and sinuses can also be used as a diagnostic aid. But do not use it as a proving ground for all kinds of shrinkers, antiseptics, etc., when the primary trouble is elsewhere. The worst noses which come to my office are those which have had the most local treatment. Take them off their self-medication for a few days and they improve.

What is sinusitis acute, chronic? I am not discussing anatomical anomalies and their effect on the condition known as sinusitis. For use in this discussion I am presuming that there are none. Consider the cavities adjoining the nose lined with an extension of some mucous membranes, any condition causing a change in one affects to a certain extent the other. The causes for trouble are the same, such as infections or contagious colds extending into the sinus or other reactions which, if they remain and do not resolve, become chronic or residual sinusitis.

The menace of the swimming pool chilling the cilia is now, as fall comes on, superseded by the dehydration of the furnace. Bryant, in the *Journal Lancet,* speaks of the effect of dry air on the cilia, and who knows but what the virtue of tincture of benzoin vapor, an old and honorable remedy, is due entirely to the humidity produced, so, at this season, assure proper humidity by wet towels over your radiators.

The majority of sinus disorders are due to systemic causes, allergy ranking high as a contributing cause—inhalation allergies, ingestive allergy, endocrine allergies and mental allergies, yes mental! The worst allergic sinusitis I ever had to treat was cured not by a physician (and she had many and some of note) but by a lawyer. A lawsuit which had been pending during two years of allergic manifestations was settled in my patient's favor, and presto! the nose and sinuses cleared immediately and have remained so for three years—in fact a very permanent result. As to the various treatments, the great variety is sufficient evidence that we have not applied the right remedies to the right causes, but have depended too much on local treatment or local surgery. We have found no relief or control for so-called colds. When we find that then our cure for sinusitis will be found.

Patients with recurrent sinusitis complain because they have a return and ask, "Doctor, why can't sinusitis be cured?" You should reply also with a question, "Mrs. Jones, can colds be cured?" The average sinus is just as amenable to cure as a cold.

Salinger in a review of the progress in Otolaryngology has this to say, "Literature in 1937 still manifests a trend toward conservative treatment, operations on sinuses are becoming more standardized, operative failures are being brought into the open for discussion and as a result one may expect a clearer conception of the indications and limitations of the various operations." With that statement, I think we will all agree, and this can be taken as a negative advance and our most important advance in the recent treatment of sinusitis. I realize that so far I have been dealing in generalities but with so many factors to consider in each case, as nearly all are different, no one treatment is suitable to all, but there are certain general rules to follow.

We should remember that for a sinus to be healthy it must be well aerated and drainage unimpeded. I would say that this is the first desideratum. Search for the cause and eliminate if possible.

The X-ray has been successful in relieving some cases and there are certain cases in which many observers think it is definitely indicated, such as those with diffuse lymphoid hyperplasia and a watery mucoid discharge with no allergic taint. There is a difference of opinion as to its value in acute cases. Rathbone, in the *Journal of Roentgenology,* says that acute sinusitis is not suitable for X-ray. The X-ray as a diagnostic aid is of great value but, to be accurate, repeated grams must be taken as the membranes of the sinus, like the nose, may be swollen one hour and shrunk the next. And even after the picture shows a pathological condition, one has to determine the nature of the pathology before instituting treatment, as it is just about as futile to treat with X-ray a sinusitis caused by a sleeping abscessed tooth, as it is to treat a

nose with drops for a condition due to eating too much chocolate. Yet daily we see pathology attacked without regard to cause.

Kornblum, in the *American Journal of Roentgenology*, states, "The roentgenologist is frequently criticized for the fact that according to his reports nearly every one has sinus disease. Pathologically this is practicaly the truth", meaning that there are few people who do not have evidence of present or past changes. Transillumination, objective and subjective examination with a *good* history, are my greatest aids. I rarely use the X-ray, largely on account of economic reasons. I much more frequently use the internist as an aid, as with the latter I may locate the cause of the condition.

Diathermy is credited with relief of pain in acute sinusitis. But in cases reported by Alexander F. Lazlo, in the *Annals of Rhinology*, none of the antra cleared entirely, some had twenty-five treatments, and cases of chronic ethmoiditis with hyperplastic charges showed no benefit. In cases of sinusitis when bone necrosis is suspected, picric acid solution, followed by calcium carbonate solution suspension has proved of value.

In conclusion, my discussion is a plea for a more *specific treatment*, or that directed to the cause, *or* the underlying cause, rather than to the effect.

General Discussion of Papers by Drs. Gatewood and Blackwell

Dr. Dean B. Cole, Richmond: For a number of years internists have recognized paranasal sinus disease as one of the most frequent and troublesome complications of nontuberculous lung infections. Experience convinces me that it is always difficult and frequently impossible to obtain satisfactory results in the treatment of chronic lung infections when the tracheobronchial tree is being flooded with pus from the upper respiratory tract. Because of this I believe an effort should be made by the internist to accurately diagnose sinus disease so that patients needing treatment may be referred to the rhinologist for proper and adequate treatment.

We now use the X-ray routinely for diagnosis because all other diagnostic methods in our hands have not been satisfactory.

Dr. W. O. Bailey, Leesburg: It is important, I think, for a man who has to deal with sinuses, not to remain silent when the thing in which he is most interested comes up. The most auspicious thing in these papers is that the essayists have approached their problems with absolute candor. I think for an essayist to stand up and avow that we have done too many operations is a very happy and commendable thing. I want to pay my tribute to their sincerity.

I want to make just a few points very briefly. About eight years ago I thought I would see whether there was any difference in the results when an acute maxillary sinus was irrigated and when it was not. I do a general eye, ear, nose, and throat practice. I do not have a great deal of sinus work. I made a few tests and was very much surprised that the irrigation, in my hands, did not seem to influence the case to a very great extent. About six years after that I attended a meeting of the District of Columbia Medical Society. There was a nose and throat specialist there from the Massachusetts General Hospital, whose name I do not now recall. I was very much delighted to find he had had a similar experience.

I try to X-ray every sinus case I have and try to read the plates. I am not an expert reader, of course, but I try to get some help, and I find that I read them fairly well. By that method I find some things I certainly did not suspect; for instance, small polyps. I do not see how in the world one could find them otherwise. Very often patients do not want polyps operated upon, but at least their presence is known.

I do not see how one can have a comprehensive and convincing picture of the condition unless one has an X-ray picture taken. I think it is of economic benefit to the patient, because I do believe that to some extent it determines the duration and course of treatment.

About once a year I write to Drs. Christie, Groover, and Merritt, in Washington, to find out if they think X-ray treatment does any good. I wrote just before coming down here. They replied that they think X-ray treatment, especially in children with acute sinus infection, is very efficacious.

Another thing—I studied a few years with Dr. Hajek in Vienna. He advised against radical operations in all sinusitis, if possible, except the maxillary. He recognized, of course, certain imperative exceptions.

I do not believe the general practitioner wants to treat sinuses unless necessary, but I believe if a general practitioner sees postnasal pharyngitis or sees congested turbinates he does not want to neglect those conditions until the patient can see a nose and throat specialist.

One other point. The nonpurulent sinus infections can cause considerable discomfort, even more than in purulent cases where there is good drainage. I think, in this specialty, when we say "sinus trouble" we mean purulent sinusitis. However, bacterial cases, without pus, and often congestion alone, may cause a great deal of discomfort.

The problem of the swimming pool is a grave one. Swimming pools are being constructed everywhere. I tell my patients, where droplets of mucus are expelled, it is impossible for the chlorine in the water to kill all bacteria before another swimmer right behind comes in contact with it.

Dr. Gatewood closing the discussion on his part: My paper dealt chiefly with the matter of diagnosis and not of treatment. I think these patients with acute inflamed antra should be given some general treatment for relief and allowed time for the acute reaction to subside. If they do not improve, they should have irrigations for a limited time. There is an old adage, "Once an antrum is irrigated it is always irrigated". This idea probably originated from the fact that chronic cases were not diagnosed properly. These cavities may be irrigated indefinitely with little benefit. Frequently there is polypoid degeneration present and the only practical way to treat such cases is to clean out the old pathology.

Putting drops in the nose as a means of treating ethmoiditis is questionable. We know that on account of the anatomical structure we cannot get drops to enter the individual cells. Each cell is a separate compartment with a minute connecting aperture. Proetz has devised a little apparatus by means of which the air is aspirated from these cells by suction and at the same time fluid is released and drawn into the cells. As a rule, I do not think that drops could do very much good in treating infections in the antral cavity. Most of the acute conditions will subside or develop into the subacute stage. It is in the latter stage that local treatment is more efficacious.

As to the chronic types, you may as well not treat them and tell the patient that some definite surgical intervention is indicated. Chronic antra are frequently associated with bronchiectasis and manifest extensive pathology. I say "antra" because the antra are involved nine times out of ten due to the fact that the antrum is the sinus which does not have dependent drainage.

DR. BLACKWELL closing discussion: I first want to thank all who have entered into the discussion of these papers.

The subject is so large and has so many different sides that it is difficult to cover fully, even a small part of it in a paper. I have tried to give you some idea of the structures we have to deal with in studying diseases of the sinuses, especially in children, and the importance of keeping the surface of the mucous membrane of the nose and sinuses in a normal condition, if we would prevent our patients from having chronic sinus trouble, with its serious train of symptoms. I have tried to show with slides the importance of the region of the nose just under the middle turbinate bone, because at this point the sinuses, most often infected, have their entrance. I have stressed the fact that the sinuses are parts of the whole body and unless we can rid the body of the things which have caused the sinus trouble, we cannot hope permanently to clear up the trouble.

HEMANGIOMA OF THE VERTEBRAE.*

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Clinical recognition of hemangioma of the vertebrae is still of sufficient rarity to warrant presentation of any authentic case. We propose, therefore, to report a case from our clinical records, and to review the relatively meagre published data, in the effort to determine the importance of the condition as a clinical entity.

Case.—Miss E. T., white, age forty-three, was referred to our Hospital January 27, 1937, by Dr. D. L. Kinsolving, Abingdon, Va., through whose courtesy the case is reported.

Complaint: "Pain at the end of the spine", recurring at intervals for twelve (?) years, with nausea and vomiting of a week's duration.

January 17, 1925, the patient had been admitted complaining of backache and dysmenorrhea. Her past history at that time was negative except for a mild influenza and sore throat twelve months before. Her tonsils had been removed just after that illness. She had suffered also with obstinate constipation and recurrent hemorrhoids. She had been incapacitated about three days each month because of dysmenorrhea. Examination was essentially negative at that time except for retroverted uterus with a tight cervix. No X-ray examinations were made. The cervix was dilated and the uterus was manually replaced.

Now, on re-admittance, the patient stated that neither the backache nor the dysmenorrhea had been influenced by the previous treatment. On the other hand, she had had no important sickness in the elapsed twelve years. The pain she now complained of was coccygeal in location. There was no soreness, stiffness nor deformity of the cervical and thoracic spine, but the patient became increasingly "nervous" as palpation passed the mid-lumbar region, and she cried out, not as if hurt, but, rather, as if apprehensive, on palpation of the sacrum and coccyx. The skin seemed sensitive in the coccygeal region ("coccygodynia"). Other than this, there were no symptoms or complaints referable to the spine; and the laboratory findings, including a complete study of the blood chemistry, were not informative.

Quoting from the roentgenological report verbatim: "The first lumbar vertebra presents a striking change in structural characteristics. The first impression is that of an osteoporosis of the body, but close study reveals that the thinned-out areas are vertical, and

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that there is an accompanying increase in the vertical and parallel trabeculae of the body. The contour of the body and of the articular surfaces is not altered. A lateral exposure of the first lumbar region again reveals the vertical and parallel trabeculation of the body of the first lumbar vertebra, with the thinned-out areas between. The articular processes and spinous process are apparently not involved. The tenth, eleventh and twelfth thoracics are entirely normal in structure, as are the second and third lumbars.

Impression: The alteration in structure of the body of the first lumbar vertebra is quite striking, particularly in view of the normal osseous structure of all other bodies shown. This observer is under the impression that we are seeing here an angioma of the vertebra involving the first lumbar body. It is requested that these films be referred to some one more competent for further study and report."

The complaints which brought the patient to the hospital cleared up under treatment. It was only after the spine was X-rayed and some comment made upon the appearance of one of its segments, that she complained of *lumbar* pain. Then, the lumbar region was strapped with adhesive, with prompt relief. She was allowed to get out of bed and to walk, without recurrence of coccygeal or lumbar pain, and was discharged relieved on the nineteenth day.

Comment: The clinician (FHS) could not reconcile the clinical display with any disease of the first lumbar vertebra. In retrospect, the clinical impression was that of a neurotic woman in whom coccygeal pain is as often unexplained as is dysmenorrhea. The acute illness of a week's duration may have been explained by the prevailing influenzal infection, with neurotic vomiting, loss of morale, and, finally, disturbance of the body chemistry.

Even so, the appearance of this first lumbar segment needed explanation, and its significance determined. The X-ray films were submitted, in turn, to Dr. B. H. Nichols, of the Cleveland Clinic, and to Dr. B. R. Kirklin, of the Mayo Clinic, with positive substantiation of the diagnosis of hemangioma from both. Our interest thus aroused, we made a rather intensive search for other cases, with the aid of the libraries of the American Medical Association and of the American College of Surgeons. Our aim was to determine, first, the frequency; and, second, the nature and course of the disease. Why has the disease—if it be a disease-entity—been so infrequently recognized clinically, at least so rarely reported in clinical journals?

The result of this study seems worth reporting. We were able to find 110 references to hemangioma of *all* bones of the skeleton. Seventy-five refer to hemangioma of the vertebrae. The study of these references develops immediately an exceedingly interesting fact, namely, that vertebral hemangioma, rarely recognized clinically, is a rather common condition in necropsy material. From Virchow, in 1863, through Eigler, in 1930, Ireland[12] found 393 necropsy reports of this condition in the literature. Of these, Schmorl, reporting in 1927, had found 115 in 1,142 bodies, and Töpfer, in 1928, had reported 257 in 2,154 bodies—a combined total of 372 cases in 3,296 bodies, or an incidence of 11.28 per cent.

Clinically, by contrast, it appears that the first case ever to be diagnosed prior to operation or necropsy is credited to Nattrass and Ramage[6] as late as 1932. Prior to our case, we can find but thirty-two references to cases in the literature,[6, 14, 16, 28] only eight in this country.[5, 6, 11, 12, 16, 18, 21, 31] It is impossible for us to determine how many of these are cases diagnosed before operation or necropsy. So far as we can determine, however, ours is the twenty-ninth case so recognized. Three have been reported since our own recognition of the condition.[42]

The explanation of the apparent discrepancy of a necropsy frequency of approximately 10 per cent of all spines examined with this condition in mind, and clinical recognition in only thirty-two cases, seems to be the fact that spinal hemangioma usually gives rise to no symptoms or clinical signs. Of the twenty-six cases recorded by Bucy and Capp[5] in 1930, only twelve gave rise to symptoms, and fourteen were discovered at autopsy. Of course, then, the discovery of hemangioma in the living must be, in most cases, purely accidental or incidental to some other roentgenological investigation, when this anomaly may or may not be recognized.

This silence of symptoms or signs in the majority of cases can be explained by the fact, or apparent fact, that the condition rarely gives rise to symptoms until there is extension of the growth from the vertebral body into the spinal canal, and such extension is unusual. When symptoms do occur they have been almost invariably those of compression of the cord, namely, progressive weakness of the lower limbs, passing, possibly, to paraplegia, with or without pain—symptoms almost indistinguishable from

an extramedullary tumor of the cord. Even if the tumor does not break through the cortex to invade the canal,[5] the symptoms of compression of the cord must be due to bulging into the canal, restricting its space. It is characteristic of hemangioma of the spine, according to Spiller, when there is remission of pressure symptoms from day to day.

The size of the lesion may be from that of a pea or even of a "pepper seed" to complete involvement of one or more of the vertebral bodies. With two exceptions, the cervical vertebrae seem to have escaped. The upper thoracic vertebrae are much less frequently involved than the lower thoracic and the lumbar. In twenty-nine cases where we have definite information, sixteen were in the thoracic region from the third to the ninth segments, and all of these without exception had symptoms of compression myelitis. Ten cases were in the lumbar region, and all were symptomless, or had only vague symptoms such as backache, etc. The two cervical cases had symptoms, as did another where the location was not mentioned. The unanimity of symptoms of compression in the cervical and thoracic cases, while none of the lumbar cases were so characterized, is interesting. Of the ten lumbar cases, six involved the third lumbar; two the fourth lumbar; one the fifth; and one heretofore has involved the first lumbar.

Credit for the description of the typical roentgenogram belongs to Bucy and Capp[5] who state: "There is irregular absorption of the bony trabeculae, and thickening of the remaining vertical trabeculae, with resulting parallel vertical striations in the body of one vertebra, together with a loss of the normal homogeneous bony structure." The abnormal trabeculation may extend, however, into the arches and laminae. It may involve more than one body.

The importance of this description cannot be overemphasized. In fact, the interest of this lesion in most instances lies in the diagnosis—in its differentiation from other more malign diseases of the vertebral bodies. Such differentiation is possible only through recognition of the characteristic roentgenographic picture.

It should be emphasized that all hemangiomas of the vertebrae are benign, both clinically and microscopically. Neither metastasis nor recurrence has been recorded, and mitosis has never been seen. There is probably no such thing as "malignant hemangioma of bone".[5]

Now we come to a second most interesting and what we consider a highly significant observation. In our research we encountered a splendid description of the intrinsic circulation of the vertebral body, by Wagoner and Pendergrass.[41] In this article they make only passing reference to hemangioma as such, but they describe in detail the *normal vertical trabeculation* within the vertebral bodies, the existence of "large, extensive and intercommunicating venous spaces, channels or tracts," and express the belief that these spaces are true venous sinusoids. What is more important, they state: "From the standpoint of dynamics of circulation, it is interesting to note that the lumbar veins passing horizontally are in direct communication with the three great longitudinal or vertical venous systems. It is seen that the circulation within the bodies of the lumbar vertebrae is interposed in a shunt-like manner in the horizontal connections among the three venous systems. In consequence, changes in the general venous or arterial pressures, due to increased intra-cranial pressure, or to the necessity of the azygos, hemiazygos, or posterior external plexus acting as collateral channels for the vena cava, would be transmitted to the venous channels within the bodies of the vertebrae. It is suggested that *prolonged alterations in systemic venous pressure should give roentgenological evidences of such change by producing variation from the normal in the calcification of the bone trabeculae of the vertebral bodies.*

While the above applies specifically to their research on lumbar bodies, it may be expected that similar or allied circulatory arrangements are maintained in the thoracic region as well, and that the above prediction would be equally applicable.

Bucy and Capp,[5] in describing tissue removed from their case of hemangioma, state: "The intertrabecular spaces are filled with dilated cavernous spaces instead of normal myelogenous tissue. These spaces contain blood cells. Their walls are lined by a single layer of endothelial cells resting on a thin network of loose connective tissue." Wagoner and Pendergrass, in describing their *normal* tissue, state: "The two posterior and the two antero-lateral veins are in direct communication. They meet in the center of the body, and form a large reservoir. In general outline they form a letter 'H', the upper side-arms bowed outward. Within the vertebral body the walls of these venous channels is a limiting membrane composed of a single layer of flattened endothelial cells."

As early as 1929, Putschar,[43] from microscopic study of four cases found in sixty-five autopsies, concludes that "these lesions could be divided into two classes—the first, in which the lesion is a true neoplasm involving the entire vertebra and often causing compression of the spinal cord; the second, in which the lesion is a simple telangiectasis occurring in an already pathological vertebra."

We here insert one simple but striking observation. Töpfer, in his 257 necropsy reports, found age distribution as follows: 0 to 30 years, 9 cases, or 3.5 per cent; 30 to 60 years, 73 cases, or 28.4 per cent; and over 60 years, 175 cases, or 68.1 per cent.

So far, very few cases seem to have been treated intensively or systematically, except those showing compression myelitis. Here, laminectomy is necessary to save the cord from irreparable damage. Surgical intervention has been disastrous so far, three of the five cases so approached having died from uncontrollable hemorrhage and shock. Limited reports of X-ray therapy indicate that clinical response is immediate and progressive, although little change could be demonstrated roentgenologically as the result of such treatment. The mechanism of the effect of radiation in its direct action is that of the production of endarteritis and occlusion of vascular spaces. Its affect is on both input and output branches of the vertebral circulatory mechanism. The tendency, therefore, would be toward equalization of arterial inflow and venous outflow, with an attendant reduction in the locally increased pressure which in itself had inaugurated the condition known as hemangioma.

The apparent innocence of hemangioma of the vertebrae, and the fact that the lesion is usually confined to a single body, causing no structural distortion of the size or shape, coupled with the great disproportion between clinical and necropsy experience, have caused us to doubt whether all "hemangiomas" of the spine are, after all, true neoplasms. When the statement is made that these "hemangiomas" may be as small as a pea, or even as a pepper seed, we wonder whether this is not merely an anatomical anomaly, congenital or developmental. It may be that such an anomaly assumes pathological or pathogenic importance only when, for some unknown reason, this defect takes on neoplastic properties.

In fact, we have cited evidence which points to a certain degree of normal reservoir- or cavern-formation within the vertebral body. The question is, how extensive this formation may be and yet remain within the normal; how large such reservoirs become before the normal becomes pathological.

With such questions in mind, we have re-studied many roentgenograms showing the spine—those taken of the spine itself, and others in which the spine is shown incidentally. We believe we can see varying degrees of vertical striation, from the finest and most doubtful, to this case which has been called by high authority "typical" and "classic." For example, we present a film taken during routine gastro-intestinal examination, in which, again, the first lumbar vertebra shows very definite vertical trabeculation. A lateral view confirms the initial observation. This case was entirely symptomless as regards the spine, although the patient was both heavy and active.

SUMMARY AND CONCLUSIONS

We report what we believe is the twenty-ninth case of hemangioma of the spine in which the diagnosis was arrived at "before operation or necropsy."

2. Our case, like most, was symptomless, or, at most, complained at times of lumbar backache, and was discovered in the course of routine investigation of coccygodynia.

3. The available published material is reviewed, to find very few articles in American clinical journals, probably accounting in part for the paucity of reported cases.

4. The disparity between the frequency of the condition at necropsy and its infrequency in clinical experience is commented upon, and the conclusion is reached that—

5. Symptomless "hemangiomas" of the vertebrae may be mere anatomical anomalies of the venous channels, and that a relatively small number may become true neoplasms through unknown means.

6. True hemangiomas probably produce definite symptoms even prior to compression of the cord. Bnt these symptoms are not often correctly recognized or named. Progression of the lesion so that it presses upon the cord is probably infrequent, and in such event it would be easy to err in identifying the exact nature and pathology of the lesion.

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TESTS FOR PERIPHERAL CIRCULATORY EFFICIENCY.

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The peripheral vascular tree is so frequently involved in various diseases that it would seem necessary to carefully examine extremities in every individual complaining of discomfort in these areas. A painstaking history almost invariably will lead to a correct conclusion even after a superficial examination of peripheral structures. It is realized that only in isolated instances will a skin temperature apparatus or an oscillometer be available to the diagnostician, but there are several simple tests that may be employed in the study of peripheral vascular disease which require no special equipment.

One may perceive, from observation, unusual smoothness or pigmentation of the skin, thickening and hypertrophy of the nails, and the presence of ulceration, infection, or gangrene. The frequent absence of perspiration about an involved limb and the disappearance of hair growth about the digits will signify a lessening of the peripheral circulation. When vascular deficiency exists, elevation of the limb frequently causes an ischemic pallor which approaches a cadaveric appearance. This effect may be hastened by active exercise of the digits or by massage to express blood from the vessels. Lowering the limbs to the dependent position causes engorgement of the veins, a livid rubor of the skin, and cyanosis of the digits, so that they may assume a deep plum color. The presence or absence of pulsation in the brachial, radial, and ulnar arteries of the arm and the femoral, popliteal, dorsal pedis, and posterior tibial in the leg, may be determined by palpation. Difficulties are occasionally encountered from anomalies of the vessels, causing variation in the size or absence of pulsation. The real difficulty in palpation is due to the wide separation of the points where the vessels are superficial enough to feel their pulsation. As an example, there are eighteen inches between the popliteal and dorsal pedis arteries and in this area no knowledge of the character of the pulse can be obtained. An ordinary blood pressure apparatus may be used to demonstrate the magnitude of the pulse in this area. Of course an oscillometer is more sensitive but unless the pulse is completely absent, some oscillations may be obtained with a sphygmomanometer. A marked difference in temperature of the extremities may be discovered by simple palpation. Accuracy in evaluating temperature changes may only be obtained by use of a skin temperature apparatus.

The cutaneous histamine reaction is a valuable aid in determining the efficiency of the superficial capillary circulation. This test is performed by placing drops of a 1-1000 solution of histamine acid phosphate on the skin surface at various locations on the involved extremities, then pricking through the drop with a small needle. Normally one should obtain a flare and/or wheal within five minutes. When the circulation is seriously impaired, the reaction may not occur in less than eight to ten minutes and may be absent.

The claudication time may be determined on individuals suffering from intermittent claudication. One hundred and twenty steps are taken a minute and the time is noted when the patient complains of pain. This test is valuable in determining whether the patient has improved after treatment.

A qualitative estimation of vascular efficiency is demonstrated by the intradermal saline reaction. This test is performed by injecting a drop of normal saline solution to produce an intradermal wheal at various locations on the involved extremity. Normally the wheal will remain for a period of fifteen to thirty minutes. If there is lessened circulation, the wheal will disappear very quickly. This test is often of no value in venous and arterial obstruction, since it may only indicate a tendency to edema.

It has become increasingly important in recent years to differentiate between the spastic and occlusive elements in peripheral vascular disease because of the difference in treatment of these two conditions. Skin temperature reactions and oscillometer studies usually aid in the final classification of these disorders.

The temperature of the body surface is dependent on several factors, such as humidity, warmth of the surrounding atmosphere, recent movement of the extremities, and the extent of vasoconstriction at the time of the test. It is well known that the use of tobacco causes a definite drop in skin surface temperature, due to its vasoconstrictor action. Acetyl-

beta-methylcholine, histamine, and typhoid vaccine, usually cause an increase in skin temperature, due to their vasodilating action.

There are several methods that will cause release of vasomotor influence in peripheral structures: wrapping the individual in warm blankets, leaving the limbs exposed for testing; production of local anesthesia by injection of novocaine into a peripheral nerve, or the injection of novocaine into the spinal canal, which produces generalized vasodilatation. The usual procedure in our clinic is to immerse the extremities in water at 45° C. for thirty minutes at a standard room temperature and humidity. Skin surface temperature readings are taken prior to this immersion and immediately after the time period has elapsed. If there is an appreciable rise in temperature, the condition is probably one of spasm and not of occlusion. If there is very little change in the temperature prior to immersion and after immersion, the process is probably occlusion and not spasm. The possibility of spasm and occlusion being present in the same individual is not unusual. Then one must evaluate the degree rather than the height of temperature rise.

Although it is difficult to completely evaluate a peripheral vascular problem without a skin temperature apparatus and oscillometer, careful history analysis and examination of peripheral structures will usually enable the investigator to rule out any involvement of the vascular tree. The simple tests that have been outlined may be performed without hospitalization or any special technique and if there is any doubt as to the disease process at least one of the procedures should be performed.

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RECENT IDEAS ON LIVER FUNCTION.*

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The liver, anatomically the largest organ in the body, also performs more functions than any other organ. The close relationship of everyone of its activities with the activities of other organs and tissues has long prevented any more than a most superficial knowledge of its physiology. While even today much of the newer knowledge at hand is the result of experimental investigation, it is believed that a brief review merits our consideration.

As a homogeneous tissue, the voluntary muscle only exceeds the liver in amount. Its numerous activities and storage capacity are doubtless made possible by this large amount of hepatic tissue. Also significant is its dual blood supply. From the hepatic artery with its intrinsic motor mechanism and under the usual arterial pressure, it derives its oxygen supply. Under relatively low pressure and under the control of the vasomotor nerves of the abdominal viscera which drain into it, the portal vein conveys the absorbed products of digestion as well as possible poison of intestinal origin. The nerve supply is derived from the sympathetic and para-sympathetic systems. Their termination is not clear and denervation appears to affect hepatic function little. Histologically, the unit of structure is the lobule. There are three essential cell constituents; namely, the cells of the biliary duct system, the Kupffer cells, and the hepatic cells. The latter cells are responsible for the greater number of functions.

Among the functions, one of prime importance is that of maintenance of the blood sugar level, both in health and disease. Dehepatization of animals results in an immediate fall of the blood sugar level almost until the blood is free from sugar. Hypoglycemic symptoms and death result. Following the removal of the liver, the injection of adequate amounts of glucose prevents the development of hypoglycemia, or its administration to the moribund dehepatized animal restores the animal. The restorative function of glucose is specific. Many substances have been tried, but only a few will restore the hypoglycemic animal. These are probably converted to glucosce. It appears that levulose can be converted to glucose by both liver and intestine. The role of the liver in hypoglycemia from insulin is not clear. Insulin causes a more rapid lowering of sugar in the dehepatized animal than dehepatization alone. However, the liver is necessary for recovery from insulin hypoglycemia. The increased concentration of glucose in the blood is likewise influenced by the

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liver. There are two essential types of hyperglycemia, that following removal of the pancreas, and the transitory type which follows operations, excitement and drugs, as epinephrine. Removal of the pancreas results in hyperglycemia. Removal of the liver in a short while produces a marked fall in sugar and hypoglycemia. Glucose injection in such instances is of only transitory benefit. There is no increased blood sugar following anesthetic and operation in dehepatized animals, and excessive doses of epinephrine do not cause demonstrable rise in blood sugar. Glycogen is an interesting phase of carbohydrate metabolism. It is normally formed in the liver in carbohydrate metabolism and decreases on exertion or fasting. It is stored in voluntary muscle in equal amounts with the liver, though the percentage in the liver is higher. That in the liver maintains blood sugar concentration. The glycogen of muscles seems to be used wholly within this tissue, and plays little part in maintaining blood sugar level.

Protein is ultimately digested down to the various amino-acids of which there are about twenty-five known. They are in turn absorbed and go to the liver and muscles. These amino-acids promptly undergo one of three processes; (1) a small portion goes to rebuild protoplasm and to form new cells. This process is not understood. (2) A portion of the amino-acids are rebuilt back into protein and stored; little of this process is known, but storage is most likely in the liver and muscle. (3) The largest portion of the amino-acids is deaminized and used as fuel. The nitrogen is broken off, converted to urea and excreted. The remainder of the molecule is converted to carbohydrate and probably used as such. The liver is essential for this last fate of protein. Observations indicate that breaking of the amino-acid molecule into nitrogen and carbohydrate does not occur in absence of total hepatic activity. Urea cannot be formed; hence the liver utilizes the greater portion of the protein. Evidence points to the fact that deaminization and urea formation occur in the liver. Uric acid is a product of nucleoprotein metabolism. The relative amount of nitrogen excreted as such is not great, though most of it is eliminated in the urine. That remaining portion which is destroyed depends upon the liver. Ammonia is converted to urea most likely by the liver and excreted as such; in the presence of acids and acid-forming foods its excretion is marked. On the contrary, administration of alkali decreases its elimination.

There is no definite evidence that the liver plays a very important part in fat metabolism. It has been suggested that it prepares fats for oxidation and also that it changes fats into carbohydrates. The actual fat content of the liver varies both in the physiologic and pathologic state. There are marked changes in diabetic states and following the administration of hepatic poisons as chloroform, phosphorous and carbon tetrachloride. Following injury by hepatic poisons, the damaged lobule first loses its glycogen content, followed by an increased demonstrable fat. An interesting fact is that the glycogen content of the liver in both physiologic and pathologic states varies inversely with the fat content.

With few exceptions, the liver does not serve as a reservoir for nor control the utilization of minerals. The chief exception is iron. The liver has a capacity for storage transformation and utilization of iron. This capacity seems wholly confined to the Kupffer cells. The liver has been shown to store copper.

The secretion of bile is the best known function of the liver. Bile is formed in the hepatic cell, secreted into the bile canaliculi which lie between cords of hepatic cells and drain into small bile ducts in the periportal spaces at the periphery. The liver is secreting continuously, the quantity varying from 500 to 1,200 cc. daily. Its rate of flow and consistency depend upon gastro-intestinal activity and the type of food ingested. Its chief function is in relation to digestion. Its value in fat digestion is associated with its ability as an emulsifying agent, and in effecting solubility of fatty acids and soap and the absorption of fats. Three important constituents of bile are bile salts, cholesterol and bile pigments. The sodium salt of glycocholic and taurocholic acid occur in bile of all animals. These acids or their salts owe their effectiveness to their ability to lower surface tension. The bile's action is dependent upon a lowering of surface tension which insures fine emulsion of fats in the small bowel. The liver is usually regarded as the site of formation of the bile acids. Cholesterol, a high alcohol related to the terpenes, is present in all cells in free and combined state. It is most abundant in the tissue of the brain and nerves. Its source must be considered as derived from cholesterol of food plus that of cellular disintegration. That of the bile is obtained from the blood where three-fourths is in combination with fatty acid and one-fourth free. The liver apparently has a part in its metabolism because nearly all of

the cholesterol of bile is in free state. The cholesterol of the bile is reabsorbed from the intestine combined with fatty acid, evidence that it has an active part in digestion and absorption of fats. The bile pigments, bilirubin and its oxidation product biliverdin are now conceded to be excretory products only. Bilirubin is formed from hemoglobin and represents that portion of the molecule the body can no longer utilize, and therefore is excreted by the liver. The amount of bilirubin in bile varies. It is influenced by the destruction of erythrocytes, liberation of hemoglobin, and the diet. A great increase occurs following a change from a diet of meat to one of carbohydrates. Bilirubin is formed from hemoglobin by the cells of the reticulo-endothelial system. These cells are in the bone marrow, spleen and other lymphoid structures and in the Kupffer cells of the liver. Bilirubin is broken down in the intestinal tract or infected biliary tract to urobilinogen. This is in turn oxidized to urobilin which is absorbed from the intestine and eliminated by the liver or kidney.

The position of the liver between the portal and the general circulation would, one should think, from an anatomic standpoint justify the detoxicating function so frequently ascribed to this organ. There appears to be general acceptance that a great many substances reaching the liver are converted from a potentially toxic to a non-toxic state. Proof that the liver actually destroys toxic substances is rare. It may absorb such substances in the manner of a sponge and by releasing them in small amounts prevent deleterious action. They may be excreted by the bile, and the fact that many heavy metals are eliminated in this manner gives rise to such an assumption. However, the possibility of their reabsorption in the intestinal tract should be borne in mind. Finally, such substances may be destroyed by hepatic activity. Observations that poisons as chloroform and phosphorus injure the liver more than any other organ are interpreted as a protective function, and deaths from such causes reveal large amounts in the liver. In regard to its destruction of alkaloids, strychnine presents the best example. Experiments prove the liver the most important site for its destruction, acting in this instance as a detoxicating function. Certain substances commonly found in the intestinal tract are made non-toxic by the liver. Particles from the blood stream, such as bacteria, are thought to be removed by the Kupffer cells. A liver rich in glycogen is more resistant to poisons than one poor in glycogen. The glucose derived from this source combines with many toxic substances inactivating them.

In fetal life, until the bone marrow is sufficiently developed, the liver is the chief site for the formation of erythrocytes and leukocytes. It is shown to be a store house for substances from which hemoglobin is made. It seems to have some relationship to some of the essential normal elements of blood as a tissue. Evidence suggests its value in regard to control of fluid volume of the blood. Its tremendous vascular bed renders it one of the blood reservoirs of the body. The hemorrhagic tendency associated with liver injury bestows upon it a place of importance in regard to coagulating ability of the blood. The decreased fibrinogen and its inability to regenerate in dehepatized animals would indicate that the liver is the probable site of formation.

The phagocytic cells of the liver first described in detail by, and subsequently named in honor of Von Kupffer, are of considerable interest. They have been described as stellate cells because their cytoplasmic processes branch out in a star-like arrangement. Formerly thought of as a part of the endothelial lining of hepatic sinusoids, and consequently a modified endothelial cell, improved methods of study do not verify this opinion. Current views are that they are not a part of any stabilized system of histiocytes known as the reticulo-endothelial system. Marked mononuclear cells in a peritoneal exudate, injected into the portal vein experimentally were recovered in the sinusoids as fixed, functional histiocytes. Conservative opinion associates them with cells of the mononuclear type. Their ability to engulf foreign particles is remarkable. Of their known functions, their role in pigment metabolism is important. With the spleen, but to a less extent, they participate in red cell destruction, while in hemolytic jaundice they do most of the phagocytosis and are important in iron metabolism. Like other cells of the reticulo-endothelial system, they function in lipin metabolism. There is marked fat infiltration in diabetic lipemia and to a less extent in Niemann-Pick's disease. When autogeneous transplants are made into hepatic tissue, these cells proliferate, desquamate and migrate to the site of the transplant and transform it into connective tissue elements.

One of the most striking qualities of the liver, revealed by experimental investigation, is its ability to regenerate. As much as 70 per cent of the liver of

dogs may be removed, and in the course of a few weeks there is found to be a 90 to 100 per cent regeneration. The restoration does not result from the formation of new lobes but from an increase in the size of the remaining lobes. The restorative powers after partial removal depend for the most part upon an intact portal circulation. There appears to be a wide margin of safety in this organ; a relatively small portion of tissue is able to perform its many functions. This probably enables the human race to escape a great many ills that it would otherwise succumb to. One significant fact is that in the presence of hepatic injury animals do not tolerate a high protein diet, but may remain in a good condition on a high carbohydrate diet.

With a better understanding of the liver and its numerous activities, efforts are constantly being made whereby clinical application of this knowledge may be had. At present there are numerous tests applicable to liver function. This is due to the fact that no one test is sufficient to interpret all functions. Then too such tests as are now employed often fail miserably when information is badly needed. They are, however, often valuable and should be employed.

The greatest single indication encountered in practice in which all available information is desirable is jaundice. The classification of jaundice devised by McNee is simpler and more nearly represents the clinical viewpoint. It divides jaundice as follows: (1) That form in which bilirubin production exceeds the ability of the liver to excrete it or hemolytic jaundice; (2) Where production is normal but bilirubin accumulates in the blood from failure of liver cells and finer bile ducts to excrete it as a result of some toxic or infectious process; and (3) The reflux of bilirubin into the blood stream from obstruction of the larger bile passages. The newer classification by Rich considers the mechanism of jaundice. According to this, jaundice is of two types. Retention jaundice, in which the bilirubin circulating in the blood is not excreted by the liver cells, accumulates in the blood and in some way seems to be bound possibly to plasma proteins, does not pass through the kidneys (acholuric jaundice), and gives an indirect Van den Bergh reaction. Such a mechanism prevails in pernicious anemia, hemolytic jaundice, sickle cell anemia, paroxysmal hemoglobinuria, mismatched transfusions, cardiac decompensation, septicemia, malaria and lobar pneumonia.

In regurgitation jaundice, on the other hand, the liver cells excrete bilirubin which then escapes from the bile canaliculi into the tissue spaces and blood sinusoids of the liver either from obstruction of the larger bile ducts or from injury or necrosis of the liver cells. In such a condition bilirubin and whole bile get into the blood stream. The pigments are not bound and are excreted by the kidneys into the urine (choluric jaundice) and give a direct Van den Bergh reaction. Such is the jaundice of conditions which cause necrosis of liver cells as chloroform, carbon tetrachloride, phosphorus, arsphenamine and mushroom poisoning, and in necrosis resulting from such diseases as yellow fever, congenital syphilis, acute yellow atrophy and Laennec's cirrhosis. Where the regurgitation follows plugging, stricture or pressure, it manifests itself in calculi, neoplasms, stenosis, adhesions, enlarged lymph nodes and gummas. Catarrhal jaundice is also a regurgitation jaundice but the exact process remains undetermined.

Accurate observation of jaundiced patients requires a determination of the amount of bilirubinemia. The skin cannot be relied upon. Jaundice usually follows bilirubinemia by twenty-four hours, and in subsidence of the process the blood loses its bilirubin much more rapidly than the rate at which the color of the skin subsides. The two commonly employed tests to determine the degree of jaundice are the Van den Bergh reaction, a quantitative method. This is performed by precipitating the blood serum proteins with alcohol, by means of Ehrlich's diazo reagent developing the diazo color, then diluting until it matches a scale representing a known amount of bilirubin. In regurgitation jaundice a direct or immediate reaction occurs, while in the retention jaundice where the bilirubin is bound, a delayed or indirect reaction results. The average normal reading is 0.5 mgm. bilirubin per 100 cc's. of blood. The other test, the icterus index, is a colorimetric comparison of a given serum with a standard potassium bichromate solution. Its normal value is 5. Thus an icterus index and a serum bilirubin of 5 and 0.5 respectively should correlate and an index of 30 should correspond to a serum bilirubin of 3 mgms. This does not accurately work out, probably because bilirubin is lost in precipitation process, and also indirect acting or bound bilirubin gives a less yellow color than unbound. One may expect a direct Van den Bergh in 80 per cent of cases of only mild hepatic injury, practically speaking. Where

there is no clinical evidence of liver injury, one should expect not more than 1 per cent direct Van den Bergh reactions. High readings 30-50 mgms. bilirubin or 300 to 500 icterus index may occur in acute degeneration of liver or malignant bile duct obstruction; figures above 30 mgms. of bilirubin or 300 icterus index probably more often mean hepatic degeneration. Obstruction from malignant growth usually falls between 15 to 25 mgms. bilirubin or 150 to 250 icterus index. Readings of 10 to 30 mgms. of bilirubin or 100 to 300 icterus are generally obtained in milder hepatic lesions and intermittent or partial obstruction. From 2 to 10 mgms. bilirubin or 20 to 100 icterus index readings are found in subsiding intra-hepatic jaundice, chronic hepatitis following obstruction or intrabiliary infection, portal cirrhosis, syphilitic hepatitis, stone in common duct, and infectious forms of cholecystitis. The merits of the two tests can readily be recognized. The Van den Bergh with its quantitative estimation and the information to be had from the knowledge that it is either a direct or indirect reaction appears the more valuable test.

The blood cholesterol determination has also added to the sum of knowledge which may be applied clinically. The normal cholesterol value is 200 mgms. per 100 cc. of blood. With complete obstruction of the bile ducts the level shows a marked increase, reaching 300 to 400 mgms., or more, and is sustained until late in the disease. In partial or intermittent obstruction of calculus, the increase is moderate and usually 250 to 300 mgms. In various hepatic diseases there is usually no increase, or a decrease. A marked decrease is of significance in severe liver degeneration.

A test commonly used, employing the liver's ability to utilize carbohydrate, is the galactose tolerance test. This test has its chief value in differentiating intra-hepatic from obstructive jaundice. A positive test denotes hepatic degeneration with resultant inability to utilize carbohydrates, as the cause of jaundice. Galactose is converted to glycogen, and the kidney has practically no threshold to it; as long as it is in the blood some is excreted in the urine. Normally, on an empty stomach, 40 grams is handled rapidly by the liver; usually less than 1 gram, always less than 3 grams, is excreted in the urine in five hours.

Hepatic injury has for some time been observed to cause a reduction of serum protein, particularly the albumen fraction, with a reversal of the albumen globulin ratio to the extent that in some cases of advanced cirrhosis the ratio has been reduced to 0.3. However, there is not much reduction of the total serum protein. This is particularly important in relation to hepatic ascites and edema. The resulting decrease in osmotic tension allows the transudation in certain cases. It is likely that this factor and not so much portal obstruction occurs in cirrhosis.

Rough tests of excretory function have employed the use of dyes. Two are commonly used, the rose bengal test and the bromsulfalein test. The bromsulfalein is generally most satisfactory. Its value is greatest in the absence of jaundice. This dye is excreted almost entirely in the bile. Retention of more than a small amount at the end of an hour indicates hepatic injury. Magath reports 95 per cent retention in cases of suspected hepatic damage.

In conclusion, it might be added that while this discussion has attempted to review the more recent ideas concerning the physiology of the liver and a few of the more practical tests which will enable us to interpret disturbed physiology, the value of the physical examination and observation of the patient is not to be overlooked. Quite to the contrary. If this will enable us in any way more easily to interpret the physical findings, or suggest supplementary aids to the study of such cases, it will have served a purpose.

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Allied Arts Building.

ONE HUNDRED TWENTY UNDERWEIGHT CASES TREATED WITH INSULIN AND DIETS.

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Since our previous report[1] of fifteen underweight cases we have continued with insulin associated with a high caloric diet and wish to add the following number of cases which have been treated since March 24, 1936. To date we have had 135 cases. These patients are taken in consecutive order in this paper, regardless of the results of the treatment or the cooperation of the patient or the small amount of weight required. We did not in any of these cases attempt to add more weight than the amount requested by the patient in order to pass his civil service examination. The procedure was similar to our earlier work with the exception that the initial dosage of insulin was as high as thirty units per day in some cases instead of fifteen units as in the first fifteen cases. Twenty-two patients did not return for treatment after the first visit when the instructions and plan of treatment were outlined. The psychological factors are seen here operating at the outset. The patient is unwilling to be convinced that he can gain the weight and thereby obtain a $3,000 year position. Many of these patients could be regarded as self-destructive types of individuals so fully described by Menninger.[2] When consciously expressed, the reasons given for this negative attitude were mostly "fear of the needle, fear of the ill-effects from insulin."

GROUP 1

Twenty two patients did not return for treatment after the first visit. The reasons given are in the above paragraph. This group might be considered as failures due to lack of ability on the part of the physician to "sell" the idea.

GROUP 2

There are twelve cases in this group who did not return after the second visit. The reasons here were not ascertainable. Since case forty-one gained one and one-half pounds in one day it may be assumed that he decided to carry on by himself. As we further study this group we see case 42 Ca. gaining two and one-half pounds in two days and case 91 Mc. gaining six pounds in seven days. This group must be considered as failures as in group 1.

PT.	REQU. WGT.	TIME DAYS	WGT. GAINED	TIME DAYS
41Ct.	4 lbs.	11	1½ lbs.	1
42Ca.	5 lbs.	7	2½ lbs.	2
86Me.	5 lbs.	10	2 lbs.	2
91Mc.	20 lbs.	60	6 lbs.	7
94Mg.	9 lbs.	14	2½ lbs.	7
109Rg.	5½ lbs.	9	3 lbs.	3
111Rs.	6 lbs.	7	3 lbs.	3
113Sj.	15 lbs.	30	2 lbs.	4
120Sh.	8 lbs.	4	2¼ lbs.	2
127Tw.	1½ lbs.	2	1 lb.	1
129Wj.	6 lbs.	10	2 lbs.	6
130Wm.	6 lbs.	7	1½ lbs.	1

GROUP 3

Thirty cases gained over ten pounds. The maximum gain in this group was sixteen pounds in fifteen days. The highest dosage was ninety units per day.

PT.	WGT. GAINED	TIME	INSULIN
16	16½ lbs.	24 days	
35	10½ lbs.	14 days	u20 ½ cc. tid
17	12 lbs.	33 days	
55	10 lbs.	17 days	u40 ½ cc. bid
18	12½ lbs.	38 days	
60	10 lbs.	14 days	u20 ½ cc. tid
19	16 lbs.	15 days	
38	12 lbs.	29 days	u40 ¾ cc. tid
39	14¾ lbs.	9 days	u20 ¾ cc. tid
40	10 lbs.	18 days	u20 ½ cc. tid
43	14 lbs.	40 days	u20 1 cc. tid
65	10½ lbs.	30 days	u40 ¾ cc. tid
69	12 lbs.	11 days	u20 ½ cc. tid
73	10 lbs.	11 days	u20 ½ cc. tid
75	13½ lbs.	50 days	u40 ¾ cc. tid
48	10 lbs.	28 days	u20 ¾ cc. tid
77	12½ lbs.	43 days	u40 ¾ cc. tid
78	10 lbs.	33 days	u20 1 cc. bid
80	10 lbs.	62 days	
93	10 lbs.	20 days	u30 ½ cc. tid
99	16 lbs.	21 days	u40 ¾ cc. tid
96	10 lbs.	30 days	u40 ¾ cc. tid
97	15 lbs.	30 days	u40 ¾ cc. tid
100	13½ lbs.	16 days	u20 ½ cc. tid
116	16 lbs.	25 days	u40 ¾ cc. tid
117	10½ lbs.	26 days	u20 ½ cc. tid
119	10¼ lbs.	17 days	u20 ½ cc. tid
121	10 lbs.	26 days	u40 ¾ cc. tid
123	13 lbs.	17 days	u40 ¾ cc. tid
124	10½ lbs.	30 days	u20 ½ cc. tid

GROUP 4

Forty cases gained from five to ten pounds. The highest rate of increase was ten pounds in eleven days with a dosage of sixty units per day in most of the cases.

PT.	REQU. WGT.	TIME	WGT. GAINED	TIME	INSULIN	REMARKS
20Mu.			5 lbs.	11 days		
23Jo.			6 lbs.	4 days		
25Da.			7 lbs.	12 days		
26Ma.			6 lbs.	7 days		
28Fr.			8 lbs.	19 days		
29Ch.			6 lbs.	28 days		
31Ke.			8 lbs.	11 days		
33Bw.			6½ lbs.	5 days		
34Bc.			5 lbs.	6 days		
44Cj.	6 lbs.	6 days	6½ lbs.	6 days	u20 ¾ cc. tid	
45Ch.	11 lbs.	21 days	9 lbs.	15 days	u20 1 cc. tid	
47Cd.	6 lbs.	6 days	8 lbs.	5 days	u20 1 cc. tid	gained 3 lbs. after treatment
49Dj.	5 lbs.	7 days	5 lbs.	7 days	u20 1 cc. tid	
50Dj.	4 lbs.	6 days	6½ lbs.	8 days	u20 ¾ cc. tid	
52De.	7 lbs.	12 days	7 lsb.	12 days	u20 ½ cc. tid	
53Ew.	5 lbs.	10 days	5 lbs.	10 days	u40 ½ cc. tid	
54Ec.	8 lbs.	14 days	8½ lbs.	16 days	u20 ½ cc. tid	
56Ff.	7 lbs.	20 days	8 lbs.	20 days	u20 ½ cc. tid	urticaria
64Gt.	4 lbs.	8 days	7½ lbs.	8 days	u40 ¾ cc. tid	
66Hw.	4½ lbs.	5 days	5 lbs.	5 days	u20 ½ cc. tid	
68Hj.	7 lbs.	7 days	7 lbs.	7 days	u20 ½ cc. tid	
72Hi.	7 lbs.	21 days	7 lbs.	21 days	u20 ½ cc. tid	
88Mf.	10 lbs.	10 days	9½ lbs.	10 days	u40 ¾ cc. tid	
85Ma.	5½ lbs.	12 days	5½ lbs.	12 days	u40 ½ cc. tid	
89Mm.	9 lbs.	15 days	9 lbs.	18 days	u20 ½ cc. tid	
91Mc.	20 lbs.	60 days	6 lbs.	7 days	u20 1 cc. tid	discont. after second visit.
101Mt.	10 lbs.	13 days	9½ lbs.	13 days	u20 ¾ cc. tid	
102Mj.	7 lbs.	30 days	6 lbs.	6 days	u20 ¼ cc. tid	
103Nf.	9 lbs.	7 days	7¼ lbs.	7 days	u20 ½ cc. tid	urticaria
104-Oo.	7 lbs.	7 days	7¼ lbs.	7 days	u20 ½ cc. tid	
106Pw.	5 lbs.	7 days	6 lbs.	7 days	u20 ¾ cc. tid	
108Pg.	5 lbs.	5 days	5 lbs.	5 days	u20 ¾ cc. tid	
122Sj.	6 lbs.	7 days	6¼ lbs.	7 days	u20 ¾ cc. tid	
125Te.	5 lbs.	21 days	6¾ lbs.	14 days	u20 ½ cc. bid	
131Wt.	6 lbs.	15 days	6¾ lbs.	6 days	u40 1 cc. tid	
132Wb.	10 lbs.	14 days	7 lbs.	14 days	u20 ½ cc. tid	
133We.	6 lbs.	8 days	6 lbs.	8 days	u40 ¾ cc. tid	
67Hj.	7 lbs.	11 days	7 lbs.	7 days	u20 ½ cc. tid	
84Kj.	6 lbs.	30 days	6½ lbs.	30 days	u20 ½ cc. tid	
46Cf.	13 lbs.	35 days	6 lbs.	32 days	u40 ½ cc. tid	nervous and irritable. Treatment discontinued.

GROUP 5

Twenty-eight cases gained from one to five pounds.

PT.	REQU. WGT.	TIME	WGT. GAINED	TIME	INSULIN	REMARKS
21He.	4 lbs.	3 days	4 lbs.	3 days		
22Cl.	4½ lbs.	4 days	4½ lbs.	4 days		
24Ro.	2 lbs.	6 days	2 lbs.	6 days		
27Do.	4 lbs.	3 days	4 lbs.	3 days		
30Mp.	4 lbs.	8 days	4 lbs.	8 days		
32Bm.	3 lbs.	4 days	3 lbs.	4 days	u20 ¾ cc. tid	
41Ct.	4 lbs.	11 days	1½ lbs.	1 day	u20 ½ cc. tid	did not return after second visit.

Pt.	Requ. Wgt.	Time	Wgt. Gained	Time	Insulin	Remarks
42Ca.	5 lbs.	7 days	2½ lbs.	2 days	u40 ½ cc. tid	did not return after second visit.
51Dh.	4 lbs.	6 days	4 lbs.	6 days	u20 1 cc. tid	
76Jj.	4 lbs.	4 days	4 lbs.	4 days	u20 ¾ cc. tid	
79Kr.	2½ lbs.	4 days	2½ lbs.	4 days		
81Kf.	4 lbs.	8 days	4 lbs.	8 days	u20 ½ cc. bid	
86Me.	5 lbs.	10 days	2 lbs.	2 days	u20 ½ cc. bid	did not return after second visit.
87Mo.	5 lbs.	7 days	3½ lbs.	7 days		
90Mm.	4 lbs.	2 days	4 lbs.	2 days	u20 ½ cc. tid	
94Mg.	9 lbs.	14 days	2½ lbs.	7 days		did not return after second visit.
95Mr.	1½ lbs.	2 days	2 lbs.	2 days	u20 ½ cc. tid	
109Rg.	5½ lbs.	9 days	3 lbs.	3 days	u40 ¾ cc. tid	did not return after second visit.
110Rj.	4 lbs.	8 days	4 lbs.	6 days	u20 ¾ cc. tid	
111Rs.	6 lbs.	7 days	3 lbs.	3 days	u40 1 cc. tid	did not return after second visit.
112Rt.	4 lbs.	8 days	4 lbs.	8 days	u40 ¾ cc. tid	
113Sj.	15 lbs.	30 days	2 lbs.	4 days	u20 ½ cc. tid	did not return after second visit.
120Sh.	8 lbs.	14 days	2¼ lbs.	2 days	u20 ½ cc. tid	did not return after second visit.
127Tw.	1½ lbs.	2 days	1 lb.	1 day	u20 ½ cc. tid	did not return after second visit.
128Vd.	11 lbs.	30 days	2 lbs.	13 days	u40 1 cc. tid	failed to gain 120 Units a day given. No further gain.
129Wj.	6 lbs.	10 days	2 lbs.	6 days		did not return after second visit.
130Wm.	6 lbs.	7 days	1½ lbs.	1 day		did not return after second visit.
134Ww.	3 lbs.	4 days	3 lbs.	3 days	u40 1 cc. tid	

Reactions

The reactions were local and general.

General

FIVE REACTIONS

Pt.	Reaction
39Bw.	Severe headache
46Cf.	Irritability and nervousness
54Ec.	Severe headaches
78Kj.	Irritability and nervousness
75Ha.	Dizziness and Nausea

Local

THREE REACTIONS

Pt.	Reaction
56Ff.	Urticaria
80Kt.	Urticaria
103Nf.	Urticaria

Dosage

The initial dose ranged from five to ten units tid., increasing to as high as 40 units tid. daily. The majority of cases received thirty to sixty units a day.

Failures

Case 128Vd. Gained only two pounds in thirteen days and with 120 units a day, the last week, failed to gain further.

Case 46Cf. Gained only six pounds in thirty-two days. A description of this case is as follows.

CASE 46 CF.

Occupation—Taxi driver—weight stripped 147 pounds. Required weight fifteen pounds. Initial dose of insulin given was ½cc. u20, three times a day.

On October 2nd, two days later he had gained four pounds but reported he was nervous and presented slight tremors. The insulin dosage was reduced to five units, three times a day. On October 5th, he weighed 149 pounds. He stated at this time that he had not taken insulin for two days, having broken his syringe. He continued with five units three times

a day until October 9th. At this time his weight was 151 pounds making a total gain of four pounds in ten days. Urticaria had developed at this time, so the brand of insulin was changed and the dosage increased to sixty units daily. On October 14th he increased his weight by another one-half pound. The insulin was increased to ninety units. On October 15th, injections were discontinued as the patient had a severe bronchitis with temperature of 103. On October 18th 1cc. of u40tid was given; on October 21st the weight had increased five pounds since the beginning of treatment. On October 26th an added one pound gain was recorded. Here the patient began to complain of irritability and nervousness, so insulin was discontinued and Ryzamine B one spoonful, three time a day (Burroughs, Wellcome and Company) was given. Dexin (Burroughs, Wellcome and Company) was substituted for sugar. Four days later, on October 30th, the patient had lost two pounds. He was immediately given ½cc. u40tid. On November 2nd he had regained his two pounds making a total of six pounds added in thirty-two days. He did not return for further treatment.

ALLERGY AND INSULIN

We find that any of the insulins on the market can be used with safety. In our work we employed Insulin (Lilly) and Insulin (Squibb). When allergic symptoms developed from the use of Insulin (Lilly) which may occur at any time during the course of injections, Insulin (Squibb) was substituted and no reactions were evident. On the other hand when Insulin (Squibb) was prescribed and allergic reactions developed, we substituted Insulin (Lilly) and the symptoms disappeared. In a few cases both makes of insulin caused reactions; then we prescribed Insulin "Special" (Lilly) which is not on the open market, as far as we know. Occasionally, but in rare instances, Insulin "Special" (Lilly) also produced urticaria. In such cases we employed Zinc Insulin Crystals* and so far have had no urticarial reactions. In the near future we expect to submit a report of our experiences with the solution of Zinc Insulin Crystals (Lilly). The solution of crystals has advantages in that it is only necessary for the patient to receive one injection daily and so far it has not been the cause of allergic symptoms. We can state, however, that so far our results have been satisfactory with Zinc Insulin Crystals (Lilly).

*Supplied through the courtesy of Eli Lilly and Company for research purposes.

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MONOCYTIC LEUKEMIA.

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The following is a preliminary report on two cases of monocytic leukemia which were diagnosed at the Shenandoah Hospital, Roanoke, during the year 1937-1938.

The first case was a well-developed and nourished white male, age thirty-nine, who came to the hospital on October 26, 1937, with a sore throat, tonsillar and anterior cervical glands enlargement. Six weeks prior to this indisposition, he had been feeling weak, with generalized aching, tired feeling, and severe headaches.

On physical examination, the soft palate was inflamed, the left tonsil was enlarged, cryptic and gangrenous, covered by a greyish-white membrane, the right tonsil enlarged, with markedly enlarged and indurated anterior and posterior cervical glands. Culture on throat was negative and smear showed streptococci. The blood picture on October 27 revealed:

Hgb.	R.B.C.	Index	W.B.C.	Polys.	Juvenile
70%	3,590,000	1.	27,600	7%	1.

Stabs.	Segs.	Lymphs.	Monos.
1	5	2	91

Achromia fragmented R.B.C.

The urine showed albumen 1 plus, occasional W.B.C. and R.B.C., few hyaline and granular casts; large number bacteria. Wassermann, negative. The

impression was either acute mononucleosis or malignant neutropenia.

Course in hospital: temperature ranged from 102 degrees to 96 degrees, pulse, 80 to 100, respiration, 20 to 22. Treatment was symptomatic with Prontylin. Throat cleared and glands reduced in size. Patient was discharged November 2, 1937, in ambulance, feeling better, but still having headaches.

On November 15, 1937, he developed infection in the right lower eyelid which was treated by the eye specialist. About three or four days later, he began having swelling in his face, finally a lumpy, indurate swelling developed on the left portion of the face just beneath the parotid gland, involving almost entirely the lateral region of the left mandible, unattached to the bone, but adherent to the skin.

On November 26, 1937, he was re-admitted to the hospital because the left jaw hung indurated and swollen. The anterior and cervical glands on the right were enlarged and indurated. No other glands palpated, and spleen not palpable as yet.

The eye ground examination of both eyes revealed no definite findings except chorioretinitis. Agglutination tests negative, blood culture negative. X-ray revealed no bone involvement. Blood picture presented leukemia, presumably of the monocytic type, because a peroxidase test revealed medium grey granules in the W.B.C. Treatment was symptomatic, plus X-ray treatment of left parotid region, chest and mediastinum, and transfusions.

Summary: Patient running septic temperature, with swelling of gums, developed infection. Several examples of the blood picture and count:

DATE	HG.	R.B.C.	IND.	W.B.C.	MONO.	SEG.	LYMPHS.
10/30/37	85%	4,000,000	1.05	27,600	91	5	2
11/27/38	70%	3,590,000	1.00	90,800	95	2	3
11/28/37	62%	3,100,000	1.	88,000	93	2	4
11/29/37	65%	3,200,000	1.04	82,200	94	1	5
11/30/37	60%	2,910,000	1.03	80,100	95	2	3
12/2/37	50%	2,490,000	1.04	78,000	94	3	3
12/4/37	60%	3,070,000	1.00	79,100	95	2	3
12/6/37	55%	2,790,000	1.01	63,600	95	2	3
12/8/37	48%	2,600,000	1.04	34,000	96	2	2
12/10/37	45%	2,210,000	1.02	22,400	96	1	3

The patient died December 16, 1937, and at autopsy, marrow specimen revealed disintegrated red and white blood cells.

Slides of the case were forwarded to the Medical College of Virginia and Dr. J. H. Scherer, too, felt the case one of monocytic leukemia.

The second case was a white female, age forty-seven, who came to the hospital because of sore mouth and sore gums, beginning a week before Christmas. An area about one and one-half inches involving anterior portion of hard palate on right side became ulcerated, bleeding, infected and painful. Smear revealed Vincent's. Her other complaint was that of excessive vaginal bleeding during periods for the past year. She had been receiving treatments for ulcerated cervix during the past three months. Her general condition was one of dibilitation and weakness.

On examination, the mouth condition and eye grounds were noted. There was retinitis, painful abdomen, uterus tender, no enlargement, adnexa negative, cervix lacerated, bleeding freely. Reflexes negative.

Patient developed infection in left ear and had free discharge of pus. Only W.B.C. found in smear.

URINE

Color: amber.	Reaction: acid
Sp. G.: 1,020.	W.B.C.: 8-10 per H. P. F.
Albumen: 4 plus.	Blood: 4-5 per H. P. F.
Sugar: Negative.	Ep. Cells: many.
Acetone: Negative.	Casts: few hyaline and granular.
Diacetic: Negative.	
Bile:	Bacteria: very large number.
Character: hazy.	Crystals:

Remarks: few mucus shreds.

Several reports on slides.

DATE	HB.	R.B.C.	IND.	W.B.C.	MONO.	SEG.	LYMPHS.
1/13/38	55%	2,660,000	1.05	23,000	93	1	7
	R.B.C. Achromia, nucleated red blood cells, etc.						
1/17/38				46,400	96	1	3
	Many nucleated red cells, large amount of achromia and polychromatophilia.						
1/20/38	55%	2,640,000	1.05	34,000	94	3	3
1/25/38				22,000	96	1	3

Smear and culture:

1/13/38 Smear shows a large number of Vincent's bacilli and spirilla.

One citrate transfusion was given the patient, several deep X-rays to the pelvic region, gentian violet to gums, and one intravenous neoarsphenamine.

Patient ran a septic course and died on February 1, 1938. No autopsy permitted.

Shenandoah Hospital.

THE METABOLISM AND THERAPEUTIC USES OF SULFUR AND SULFUR COMPOUNDS.

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The sulfur that we know today is of historic value, its usage being both ancient and honorable. The long continued usage of sulfur has depended on the quality of service this substance has rendered. It is doubtful if any other one element does as many different things as sulfur and does them as well. Sulfur is referred to as a "building stone". It is known that sulfur is characteristic of the epithelial cells, that it is essential for the cell metabolism of every gland of internal secretion and tissue in the body, that there is a metabolic preference for proteins rich in sulfur, that some sulfur-containing unit occupies a key position in the protein molecule, that it hastens and facilitates a transfer of oxygen and oxidative substances in the living cells, and that the potency of insulin, vitamin B_1, important amino acids and other substances is parallel to their sulfur content. In the light of our present knowledge of this far-reaching element, it is reasonable to believe that a further tapping of the fertile and prolific sulfur field through expanding interest and additional research will reveal undisclosed ramifications into allied channels of medical usage.

Because of the increasing importance placed on colloidal matter with reference to the living organism, and the frequency with which the medical profession is confronted with new therapeutic agents in the colloidal state (sulfur as well as others), we shall first describe briefly colloidal phenomena and some of their relations to medicine.

COLLOIDAL CHEMISTRY AND SOME OF ITS RELATIONS TO MEDICINE

The old schools of physics and chemistry defined three states of matter, namely solid, liquid and gaseous. There is a fourth state, colloidal state, which is not included in this classification, and its existence has recently been justified on the grounds "that nature does not like to skip". Nature's processes are evolutionary; and in the division of matter there is a gradual subdivision (change) of particle sizes from that of the molecule to that of matter in mass. Although the colloidal state is as old as living matter itself, and fundamental to all protoplasm the science of colloidal chemistry is only in its beginning. It was from a study of the consistency of protoplasm that colloidal chemistry developed. Colloids constitute heterogenous systems being composed of particles of matter of many dimensions, limited only by certain arbitrarily fixed magnitudes. Particles of matter with diameters as large as $mm/10^4$ and as small as $mm/10^6$ are considered to constitute the range of colloidal particle sizes. The ability to exhibit the Tyndall phenomenon and Brownian movement also characterizes colloids. On precipitating from a true solution all substances first enter the colloidal state but many pass immediately into the ordinary coagulated form. The intermediate state (e.g. ordinary fog) between the gaseous and liquid phases exists as drops of liquid suspended in a gaseous medium (air). Likewise, during the transition from the liquid to the solid state a similar evolutionary process takes place (e.g. the precipitation of a salt from a solution). First very small liquid droplets appear which gradually coagulate into solid particles of relatively large dimensions. Some substances, for example proteins, undergoing transition usually remain in this intermediate state.

Surface Energy. Colloidal chemistry introduces to us a world of neglected dimensions. The relatively enormous surface of a colloid compared to its mass is its most important property. For each unit of surface exposed every solid substance possesses a specific electrical, physical and chemical activity. The characteristics of a given substance are magnified proportional to the increase in the surface caused by the change into the colloidal state. The increase in the surface of a fixed mass of any substance is inversely proportional to the change of the diameters of its constituent particles. One gram of a substance with a specific gravity of unity and particles of average colloidal size has exposed six hundred (600) square meters of surface, while the same material as one cubic mass has a surface of only six (6) square centimeters.

Large surfaces represent a great deal of energy, which we speak of as surface energy. Until recently this tremendous source of energy was neglected by the scientific world. It is now known that nature is full of this kind of energy, and we believe that energy supplied by substances in the colloidal state is one of the most useful and efficient forms. The ordinary mechanical engines are rigid and limited, but the cells of living organisms, having proteins and lipoids in the colloidal state as their chief ingredients, gain energy from a non-rigid nucleus. The colloids form a vast surface structure not visible under the microscope, but continuously and uniformly supplying energy for the operations of the cell.

Colloidal ferments establish the time and place for metabolic processes in the tissue fluids as well as in the cells themselves. Glandular secretions, food absorption and many therapeutic measures are made possible by osmotic pressures established by colloids. Muscular action is unquestionably due to forces caused by the surface energy of colloids. Alterations in the protoplasm of nerve cells due to strains on the nervous system are brought back to their normal state of equilibrium under the forces created by this same source of energy.

Stabilizing and Protective Forces. Facts are slowly becoming available which verify the hypothesis that the function of the cells depends on an interchange between the electrically charged ionic products of salts and colloids. Colloidal surface energy seems to stabilize the bio-electrical currents which regulate the function of all organs.

A definite concentration of certain ions must be present in the body fluids to stabilize the colloids in order that the cells function normally. The hydrogen-ion and hydroxyl-ion relationship is of first importance, since by maintaining a specific concentration of these ions an equilibrium condition of the human system is retained throughout life. Certain other ions, e.g. those of sodium, potassium and calcium in the ratio of 100:2:3, are important to retain the correct hydrogen and hydroxyl-ion concentrations. Protective forces are always at work guarding the normal relationship between all parts of the organism, which we may also say is the maintenance of the body colloids in a normal condition. The achievement of a unity may be said to be the purpose of all cell functions. A classical example of a departure from this goal is the inflammatory process including such diseases as edema, rheumatism, infections, etc. The diagnostic value of colloidal phenomena in the practice of medicine is concretely illustrated by many well known laboratory tests. The detection and interpretations of colloidal reactions, exhibited by Wassermann's test, blood and urine analyses, sugar and protein tests (Fehling's, Benedict's, Heller's ring test, etc.) give the answer to the possible existence of a pathological condition.

From the foregoing the importance of colloidal chemistry to therapeutic medicine is evident. The effectiveness with which artificial remedies can be applied depends on how well the protective and curative methods of nature are understood. We must also realize that in spite of the strong protective forces within the living body to prevent agents, which enter body fluids, from altering the function of certain cells, that clinical investigation shows that variation of cell function can be affected. Consider for example the hardening effect of calcium on the diluted colloids of inflammation and the softening effect of iodine therapy on the colloids of sclerosed vessels. Many modern therapeutic agents are fundamentally colloidal, e.g. proteinotherapy, immunization antigents, ferments, etc. In affecting their actions they usually alter certain colloids of the body. Colloidal chemistry has also shown us new methods for applying inorganic drug therapy. Certain substances, heretofore considered too feebly soluble, and in some instances too toxic when in true solution, have been converted into colloidal solutions possessing valuable therapeutic properties without untoward actions. It is in fact difficult to separate any therapy from colloidal chemistry. One can safely say that a successful therapy always affects certain colloids in the body.

Colloidal chemistry, although still in its infancy, has given more insight into the life of the cell than any other science since the introduction of the microscope. It renders a service in the establishment of a pathology as well as a rational therapy.

THE PREVALENCE AND DISTRIBUTION OF SULFUR IN THE BODY

As more work is done on the composition of biological material more sulfur bearing compounds are brought to light. Although the quantitative amount of sulfur in the body is small (0.25 per cent) compared with the quantities of such elements as carbon, hydrogen and oxygen, it is indispensable to the vitality and activity of the organism. A disturbance in the sulfur equilibrium produces pathological changes

of unpredictable consequences. Many of these changes are transitory and disappear without excessive discomfort, provided the sulfur balance is reestablished before the transformation goes too far. In an analysis of the total sulfur content of the organism from birth to maturity, Klauder and Brown found that the total sulfur content correlates growth; as growth decreases with the age of the subject the sulfur content likewise decreases. Sulfur is characteristic for epithelial tissues as iron is for the red blood cells and calcium for the bones. The presence of sulfur is known to be fundamental for the cell metabolism of every gland of internal secretion and tissue of the body..

A distribution of sulfur in the body occurs as: ordinary tissue proteins, found in hair; mucoitin sulfuric acid, in mucin; chondroitin sulfuric acid, in cartilage; glycoproteins, in tendons; vitreous humor, in cornea and connective tissues; glutathione, in all active cells; insulin, in the pancreas; cystine, in finger nails, hair and tissues generally; taurocholic acid, in bile; sulfocyanates, in saliva; ergothioneine, in red blood corpuscles; vitamine B^1, in the liver and pancreas; melanin, in most hard tissues as hair, choroid, etc.; urochrome, in the urine; and sulfolipoids, in nervous tissue. Inorganic sulfates occur in the body fluids generally.

AN ESTIMATION OF THE AMOUNT OF SULFUR REQUIRED BY THE HUMAN ORGANISM DAILY

Utilizing data given by Hawk and Bergeim, we learn that the neutral sulfur excreted is normally about 25 per cent of the total sulfur, and on considering the range of all cases we find that 75 to 95 per cent of the total sulfur in the urine is sulfate, the proportion being greatest while the person under observation is eating a high protein diet. The total quantity of sulfur excreted in the urine daily by a normal adult on a mixed diet is between 0.6 and 1.2 grams, with an average of about 0.8 gram. If we add 25 per cent of this to account for the sulfur lost in hair, nails, feces, perspiration, breath, etc., there will be on an average a loss of 1 gram and a maximum loss of 1.5 grams of this element by each person daily.

To maintain an equilibrium condition each person must consume between 1 and 1.5 grams of sulfur daily. A standard diet given by Atwater calls for 127 grams of proteins, 113 grams of fat and 494 grams of carbohydrates with a combined fuel value of 3,500 calories. A standard daily diet then contains about 1.6 grams of sulfur, slightly more than we estimated to be lost by the organism. However, everyone does not always consume a standard diet. When a small amount of sulfur is contained in the food eaten, a correspondingly small amount is excreted. The fact should be kept in mind that a large part of the sulfur contained in foods is utilized to detoxify metabolic products of foodstuffs themselves. In certain instances there may not be a small excess available to combat abnormal intoxication, thus requiring the sulfur of the tissues to be diverted. It is no doubt under such circumstances that marked benefits are derived from a few grains of uncombined sulfur when administered for its nutritional value and detoxifying action.

The following data gives an estimation of the percentage by weight of sulfur found in some of the more common foodstuffs:

Oysters	.02
Horseradish	.02
Dried beans and nuts	.02
Oatmeal	0.2
Meats (largely lean)	0.15 to 0.2
Fish	0.15 to 0.2
Eggs	0.15 to 0.2
Wheat (whole)	0.18
Cabbage greens	0.17
Water cress	0.17
Bread	0.1 to 0.2
Bacon	0.1
Rice	0.1
Fruits (dried)	0.05 to 0.2
Onions	0.07
Milk	0.035
String beans	0.03
Potatoes	0.03
Vegetable (average green)	0.01 to 0.03
Fruits (fresh)	0.01 to 0.015
Berries (fresh)	0.01 to 0.015
Fats	0.01
Butter	0.01

METABOLISM OF SULFUR IN THE BODY

Sulfur of first importance to life is largely found combined in protein substances. A surplus of proteins occurs in living matter only when necessary for the formation of tissues in the developing young, as in eggs, seeds and milk. Proteins are unique foodstuffs whose primary function, in addition to supplying energy, is to build up and repair living tissues of the organism itself. They are of paramount importance in conferring on the various cells their biological specificity. The protein molecule is composed of amino-acids linked together; twenty-two or

more of these acids are known, several of which have a high sulfur content.

Under normal conditions the anabolic and catabolic phases of sulfur are in equilibrium. Thiopexy is the term designating the fixation of sulfur in the organism. It is generally considered that proteins containing sulfur undergo three distinct metabolic changes. First, sulfur is degraded from the protein molecule in the form of neutral, unoxidized, or partly oxidized sulfur—occurring in such compounds as methionine, glutathione, cystine and cysteine. This form is eliminated from the body in such substances as: cystine, taurine, cysteine, hydrogen sulfide, ethyl sulfide, thiocyanates, oxyproteic acid, allyloxyproteic acid and certain conjugated compounds (mercapturic acids). Second, a greater part of the neutral-sulfur is not eliminated as such, but undergoes oxidation to produce sulfates or the sulfuric acid form. Most of this oxidized form is excreted in the urine as the sodium, potassium, calcium and ammonium salts. Third, a portion of the oxidized sulfur is conjugated with putrefactive bodies (phenol, cresol, indole, skatole, alcohols and amines) that are absorbed from the intestines and foci of infection, and excreted through the kidneys.

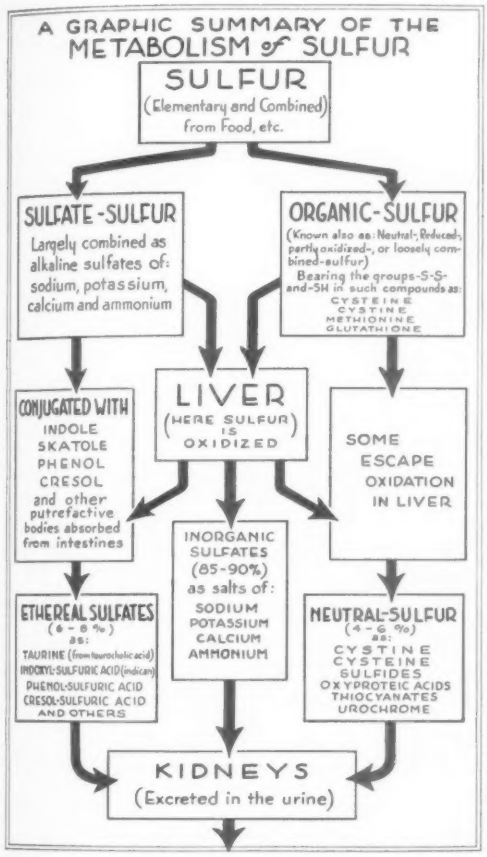
"The great bulk of sulphur loss to the body occurs through the kidneys in the form of inorganic sulphur, neutral sulphur and ethereal-sulphate sulphur."[1] This sulfuric acid arises principally from the oxidation of exogenous as well as endogenous protein material. A relatively small portion is derived from ingested sulfates. "Fairly large amounts of sulphur are secreted in saliva."[1] The amount of sulfuric acid excreted in the urine is increased during pathological conditions involving acute fevers, suppurations and by all diseases marked by a stimulated metabolism, whereas a decrease is observed in those diseases accompanied by a loss of appetite and diminished metabolic activity. "In urine increased sulphur elimination is found in such conditions as melanotic sarcoma, carcinoma, diseases of the liver, acute intestinal obstruction and cystinuria."[1] Loss of sulfur from the body also occurs in the shedding of hair, nails, skin, etc., in the bile, saliva, breath, perspiration, and gastro-intestinal secretions.

There is a preferential metabolism of sulfur-rich proteins. While the metabolism of sulfur in the body seems to revolve around the compounds cystine and glutathione, methionine has recently been found to hold a place of prime importance also.[3] Sulfur appears to be a mobile metabolic unit accessible for early catabolism. The evidence for preferential metabolism of sulfur-rich proteins is attested to by the early excretion of cystine in the urine. Wilson[3] explains the labile role of sulfur in both phases of metabolism by saying, "cystine or some unit containing sulphur occupies a key position in the protein molecule or even in the living protoplasm whereby it is the first to be split off in catabolism and the first to be retained in anabolism."

Sulfur plays a role in oxidation-reduction processes. The unicellular paramecium can synthesize carbohydrates, fats, proteins and protoplasm from inorganic compounds if sulfur is present. If sulfur is not present there is an accumulation of fat, resulting in death by what appears to be fatty degeneration. The conclusion is, the fat is synthesized from starch and the sulfur oxidizes the fat as fast as it is formed, but if sulfur is not present fat does not oxidize and consequently accumulates. Sulfur may be thought of as an agent supplying energy to the individual cell, which is a seat of continuous chemical activity. "Sulphur-containing bodies, especially those having sulph-hydryl forms, such as cystine, cysteine, and the closely-related amino-acid methionine, are the sources of glutathione which is most necessary for cellular respiration and therefore life, and also taurine which is concerned in the formation of taurocholic acid of the bile."[1] There is an analogy between sulfur and oxygen in kind and scope of activity; and in practically all organic compounds sulfur can replace oxygen. Sulfur plays a multiple role in oxidation-reduction processes of the body. In the reduced easily oxidizable state as in cystine sulfur seems to tie itself to oxygen. When the sulf-oxy combination comes in contact with a selected environment, e.g. liver cells and material to be oxidized, it is logical to believe that oxygen is released. Normal oxidation then takes place, liberating energy for the promotion of protoplasmic activity. Cysteine, which is "auto-oxidizable," is converted into cystine, e.g. 2 Cysteine + Oxygen = Cystine + Water. Glutathione, an "auto-oxidizable" compound contained in every living cell, plays an important part in the oxidation that occurs there.

SULFUR IN DETOXICATION

Colloidal sulfur enters the hepatic circulation, combines with toxins and secures their elimination through the kidneys. The blood stream is thereby freed of poisons and proceeds unhampered in its



various physiologic reparative functions. Improvement in mental and nervous disturbances is often so marked as to indicate that the central nervous system is also highly susceptible to endogenous toxins. "Detoxication seems, indeed, a prominent role of the system cystine, cysteine, and glutathione. In the majority of the arthritic cases the low cystine content of the finger nails seems to imply an intoxication factor which draws on the sulphur complexes . . . and thus diverts the sulphur from its normal channels. . . . The increase of the cystine content of the finger nails of a number of cases of arthritis, after injection of sulphur, implies that the sulphur directly or indirectly, after change by the body, combines with the injurious material and thus spares the normal body sulphur complexes from being diverted."[8] The mobilization of sulfur from normal deposits in the body results in a deficiency of the loosely bound sulfur. Virtue *et al* and Stekol have demonstrated that toxic substances when administered to fasting animals are conjugated with endogenous sulfur and excreted as harmless compounds; e.g. cystine (di-cysteine) is employed for the detoxication of bromobenzene when the latter is ingested. Cysteine becomes conjugated with bromobenzene followed by acetylation producing bromophenylmercapturic acid.

$$\underset{\text{Bromo-benzene}}{BrC_6H_5} + \underset{\text{Di-cysteine}}{(S\text{-}C_3H_6O_2N)_2} + \underset{\text{Acetic Acid}}{C_2H_3O_2H}$$

(yields)

$$\underset{\text{Bromophenyl-mercapturic Acid}}{BrC_6H_4\text{-}S\text{-}C_3H_5O_2N\text{-}C_2H_3O} + \underset{\text{Cysteine}}{HS\text{-}C_3H_6O_2N} + \underset{\text{Water}}{H_2O}$$

A similar mechanism may be used to explain the detoxication of naphthalene. The excretion of sulfoconjugated compounds was evidenced by a rise in the output of total sulfur in the urine and by a reduction in the sulfur content in internal secretions. It was also shown that in the absence of sulfur in the diet the nitrogenous products were excreted in the urine as urea; while with an adequate supply of sulfur in the diet the nitrogenous breakdown products of the attacked tissue were utilized for its resynthesis.

The highly toxic base, histamine, loses its dangerous physiological activity when combined with sulfur as thiolhistamine. Forbes[4] and Neale state that "Indole was found in significant amounts in many cases of chronic arthritis, pellagra, diabetes mellitus, tuberculosis, toxemia of pregnancy, congestive heart failure, and lobar pneumonia, but not in the urine of normal subjects." "Sulphur is a major factor in the detoxification of indole." The latter substance, after being oxidized by the liver to indoxyl, combines with sulfuric acid and is excreted from the organism as the neutral potassium salt, indican. Phenols, amino-bases and alcohols may also be tied with sulfates and excreted without doing harm to the body. It has also been demonstrated that cyanides and carbon monoxide are converted into non-toxic sulfocyanates (rhodanantes) and carbon sulfoxide by the element sulfur. Glutathione as well as thiosulfates have been found to protect animals from lethal doses of arsenic .

Some Sulfur-Containing Compounds Promoting Biological Processes

Sulfur and sulfur compounds are essential for the composition and function of every cell. Since there is no limit to the possible number of carbon compounds containing sulfur a complete survey of these substances cannot be presented. A description of

some of the more important and better understood of the sulfur-containing compounds is briefly given in the following:

Methionine, gama-methylthiol-alpha-amino-butyric acid ($C_5H_{11}O_2NS$) containing 21.9 per cent sulfur, is an amino acid derived principally from proteins by acid hydrolysis. It is an essential constituent of the diet in as much as it seems to be indispensable in the promotion of growth.[2] *Cysteine,* alpha-amino-beta-thio-lactic acid ($C_3H_7O_2NS$), containing 26.4 per cent sulfur, is an amino acid obtained in nature by reducing a hydrolytic product of proteins. It can be synthesized in the laboratory from certain elements and simple compounds. Cysteine readily undergoes dimolecular oxidation, producing *cystine* ($C_6H_{12}O_4N_2S_2$) which contains 26.6 per cent sulfur. This latter compound may also be prepared by acid hydrolysis of proteins. It is generally believed that there is an equilibrium between cysteine and cystine in the living organism, but so far this has been primarily of theoretical importance. "For many years cystine was thought to be an essential amino acid. Later work has made clear that the other sulfur containing amino acid of proteins, methionine, is essential for growth but that cystine is not. However, if the amount of methionine in the diet was not sufficient to permit normal growth, it was observed that the addition of small amounts of cystine would accelerate growth. It has been suggested that methionine forms some substance which also can be formed from cystine and that this derivative is necessary in order that growth can occur. To a limited extent, therefore, cystine can replace a portion of the methionine in the diet."[3] *Glutathione,* a crystalline tripeptide ($C_{10}H_{17}O_6N_3S$) containing 10.4 per cent sulfur, is synthesized from glycine ($C_2H_5NO_2$), cysteine ($C_3H_7O_2NS$) and glutamic acid ($C_5H_9NO_4$) and it can also be prepared by incomplete acid hydrolysis of proteins. Glutathione being water soluble is found uncombined in active tissues and fluids of the body, the young animals having the highest concentration of it. Considerable evidence is available demonstrating the role glutathione plays in oxidation-reduction processes. We believe that this latter property is contributed by the cysteine (sulfur) part of its molecule.

Insulin, a hormone secreted by the pancreas, is essential for the metabolism of carbohydrates. "All the available evidence points to insulin's being a protein consisting mainly of leucine, glutamic acid, tyrosine, histidine, and cystine. The empirical formula derived by Abel for his crystalline insulin is $C_{45}H_{75}O_{17}N_{11}S$."[5] The pure crystalline compound contains over 3 per cent sulfur, all of which is believed to be combined in a cystine unit in the molecule. White and Stern report that insulin when reduced with certain substances remains physiologically active and the sulfur in its molecule is present as mercaptan groups; while reoxidation of the last mentioned form destroys the sulfhydryl groups, leaving a product physiologically inactive.

Vitamin B_1, ($C_{12}H_8ON_4S$) (12.5 per cent sulfur) a crystalline compound the chloride of which melts at 246 to 250 degrees C., is now produced synthetically, or it may be extracted from brewers yeast, whole grain vegetables, milk, eggs, liver, and the pancreas of animals. Fukushima observed that vitamin B_1 increases tissue oxidation in mammals. Yarusova has found that a small amount of it is stored in the animal organism when fed in excess. On account of the rapidity with which the organism may be depleted of this substance, vitamin B_1 deficiency no doubt plays an important part in aggravating alcohol addiction and other conditions common to persons whose diet consists mainly of carbohydrates.

Ergothioneine, trimethylbetaine of thiohistidine ($C_9H_{14}N_3O_2S$) containing 14.0 per cent sulfur, was first obtained from ergot, but it is also found in some of the cells of the body, e.g. red blood cells.

Taurocholic acid ($C_{26}H_{45}O_7NS$) contains 5.2 per cent sulfur, is found principally in the bile of animals, and may be synthesized from taurine and cholic acid. *Taurine,* a colorless water soluble crystalline acid containing 25.5 per cent sulfur, aminoethylsulfonic acid ($C_2H_6NO_3S$), is found in tissues of the lungs and muscles, as well as in combination with taurocholic acid. It may be prepared by direct synthesis, hydrolysis of taurocholic acid, or extracted from animal tissues.

PELLAGRA AND AVITAMINOSIS

"Certain conditions exist where the diets are low in organic sulphur and the constant drain upon the -SH of the body cannot be replaced. For instance, the diets in such diseases as pellagra, pellagroid, acrodynia, black tongue, xeroderma, lathyrism, and perhaps also ergotism, sprue and others, have been known to contain cyanic and other toxic substances but their organic content of sulphur and minerals are low. The consequence is the cells suffer from a

relative lack of oxygen (histotoxic anoxemia), and certain forms of degeneration then arise within the body. To this lack of body sulphur and minerals may be due many other obscure lesions which are at present attributed to this or that vitamin deficiency. This deficiency may also possibly play a role in such diseases as disseminated sclerosis, pernicious anemia, malignancy, tuberculosis, chronic muscular and joint affections, and certain skin disorders, all of which are benefited by various forms of sulphur therapy. The low sulphur content found in these and other disorders may be the result of increased demands made by the body for additional sulphur for detoxifying purposes."[1] Sabry discovered that sodium thiosulfate would cure cases of human pellagra. He believes that the available sulfur in this compound ties itself with and detoxifies a poisonous substance which causes the disease. Clark postulated that pellagra and allied diseases are due to slow prussic acid poisoning. He substantiated this belief by pointing out that the diet of all patients suffering from these diseases contain foods such as: cassura, maize, sugar cane, corn, peas, and beans all of which yield prussic acid during metabolism. Sulfur combines with prussic acid to produce thiocyanate, a large excess of which is found in the urine and saliva of pellagrins. Smith calls attention to five cases of uncomplicated pellagra in which chemical analyses revealed a decrease in the sulfatides associated with degeneration of the tissues. There was also a loss of neutral sulfur in the cerebrum and spinal cord. Furthermore, diets which have been found useful for the prevention of pellagra are effective in proportion to their sulfur content. An adequate supply of sulfur appears to exert a protective influence against the pathologic effects of solar radiation. Evidence suggests that an inadequate supply of sulfur as cystine is an important cause of pellagra and the abnormal metabolism of sulfur an important feature of it. It has been further demonstrated that the addition of sulfur to the other measures used in combating pellagra brings about a more marked and complete response.

Avitaminosis: Wright has described a disease characterized by the early symptoms of: epithelial lesions on the tongue, lips, angles of the mouth, scrotum or vulva, and conjunctiva and day-blindness, suggestive of pellagroid maladies. This entity has been found to be due to A and B avitaminosis and sulfur deficiency. Persons receiving a diet containing an excess of starches (low in sulfur) develop this syndrome; while it improved by increasing either the vitamin A or vitamin B intake, recovery became prompt and significant with the addition of sulfur therapy. Conclusions were reached that vitamin A and vitamin B can remain inactive in the body if the sulfur content falls below a certain level.

DIABETES MELLITUS

Attention has been called to the existence of a relationship between the liver, the insular system of the pancreas and the suprarenals, and also to a distinct effect of the thyroid and of the central nervous system on the activity of the liver cells. This suggests that a disturbance in the function of one endocrine gland or even the function of the liver, e.g. diabetic conditions, would result in an imbalance of the endocrine system. The favorable results obtained by certain investigators in treating diabetics with sulfur calls attention to a possible relationship between sugar metabolism and sulfur metabolism. This hypothesis has been confirmed by animal experimentations and observations on diabetic patients. The sulfur treatment lowered the blood sugar; increased the tolerance for carbohydrates; and affected the decomposition of acetone bodies. Sulfur therapy with an unrestricted diet has been found to usually correct hyperglycemia associated with benign diabetes. The clinical results obtained by treating diabetes with sulfur have been reported to be similar to those obtained from the use of insulin. The hypoglycemic effect of insulin is presumably parallel to its sulfur content; while insulin preparations from which sulfur has been removed are no longer effective. These facts lead us to believe that the organism utilizes sulfur for the synthesis of either insulin or insulinoid compounds.

A study made by Heinmann revealed that sulfur decreases the basal metabolism. Rabbits and rats treated with sulfur showed an increase in the glycogen content of the liver and a simultaneous decrease of blood sugar. The serum of the sulfur-treated animals produced hypoglycemia when administered to other animals. The effect of sulfur is slow and gradual, while the effect of insulin occurs rapidly and increases with the dosage. Echtman *et al* have observed that sulfur therapy is most effective when it is administered in small doses for an extended period of time. Diabetics with slight disturbances in the liver function have been very favorably

influenced by sulfur therapy, but this treatment becomes less effective as cirrhosis of the liver increases. Although the physiological significance of the chemically bound sulfur of the insulin molecule is not fully clear, there is no doubt that sulfur exerts a very favorable effect on the metabolic processes of the liver, and that sulfur therapy has a very favorable influence on diabetes mellitus.

ARTHRITIS

"In spite of the enormous numbers of sufferers from arthritis, and its economic importance, there are few conditions which present so many medical problems and concerning which there is such diversity of opinion, especially with reference to therapeutic measures."[2a] "The Council concurred in the referee's conclusions and voted not to accept any form of sulfur for the treatment of arthritis at present. The introductory statement affirms that before acceptance satisfactory evidence must be produced that sufficient controls have been employed and that follow-up periods of sufficient length to rule out spontaneous remissions have been observed. Further, the types of cases in which the preparation may be used with a fair expectation of benefit must be determined, and the chief contraindications, optimal dosage and best form and route for use must be defined. These criteria as outlined for sulfur therapy in arthritis could well be employed in assessing the value of any other of the many drugs employed in this chronic and clinically variable disease."[2b]

Woldenberg suggests that arthritis is the result of a metabolic disturbance superimposed by an infection. On this basis it would seem that the essential things to do are to remove the foci of infection and destroy or neutralize the toxic metabolites. An increase in the formation of histamine is usually observed in patients with arthritis. Forbes[4] and Neale found abnormally large quantities of indole in the urine of a majority of the cases they studied; and we know that sulfur combines with histamine as well as indole to produce non-toxic compounds. According to Sullivan[8] and Hess the low cystine content of finger nails in a majority of arthritic cases points toward an intoxication factor that utilizes the sulfur complex and diverts it. This reduction of the concentration of sulfur-containing compounds in tissues probably causes atrophy. It is also felt that as cystine is mobilized from deposits in the body for protection against toxins there results a deficiency in the loosely bound sulfur that also seems to influence the production of hormones and enzymes. "If there be a deficiency, or improper assimilation, faulty metabolism, etc., the available -SH would be reduced resulting in a diminished cellular activity with disturbances in the oxidation-reduction and detoxifying phenomena. The role played by organic sulfur and its distribution in the body is a large one."[1]

Professor Cawadias at Athens University pointed out that the cells in an arthritic patient have lost the abilty to retain sulfur in the same manner as the cells of tuberculars have lost the ability to retain calcium or the cells of the diabetics to utilize carbohydrates. The clinician often finds in patients with arthritis accompanying pathological conditions upon which sulfur frequently exerts beneficial effects. Some of these conditions are: arteriosclerosis, hypertension, chronic nephritis, myocardial degeneration, cardiovascular diseases, obesity, diabetes, chronic gastro-intestinal disturbances, etc. During the customary treatment of the associated symptoms arthritis may be aggravated, thus making the patient the victim rather than the beneficiary of drug treatment.

Woldenberg[10] states that "regardless of the etiological factor operating in any individual arthritic case, it is certain that the metabolism of the patient has been either overloaded or impaired. This metabolic deficiency may be due to a disturbance or interference in the capillary circulation." Recent studies made by Loeper *et al* show that sulfur has a definite relation to the cartilage in the joints and is important in maintaining the metabolic balance of the cartilage. Tissues of arthritics show a definite hunger for sulfur. They also learned that in chronic arthritis there is not only a deficiency of sulfur in the joint cartilages, but also a disturbance of sulfur metabolism in general. This disturbance was shown by a decrease in the glutathione content of the blood, an increase in total sulfur content of the serum and an increase in the amount of sulfur absorbed by rheumatic persons as compared with normal values. McDonagh points out that colloidal sulfur is of value in treating every case where fibrosis is occurring or has occurred, provided the fibrous tissues have not become completely organized.

In sulfur therapy of arthritis, according to Senturia,[7] "there are no contra-indications so far as could be determined. Patients with chronic myocarditis, cardiac decompensation, chronic cardiac valvular disease, hypertension, arteriorsclerosis, hemi-

plegia, diabetes mellitus, epilepsy, bronchial asthma, chronic bronchitis, pulmonary emphysema, cirrhosis of the liver, and various endocrinopathies were not adversely influenced by the treatment. No signs or symptoms suggesting damage to any of the systems developed. Routine urine examinations failed to reveal any change in kidney function." The benefits derived from sulfur therapy have been attributed by some to the replacement of sulfur lost by the arthritic patient. Certain authors believe that sulfur treatment should begin as early as possible to avoid unnecessary suffering. It has been pointed out that sulfur is definitely indicated in the treatment of chronic rheumatism, because it has a profound and complex effect on the nutrition of joints and also on the general metabolism.

DERMATOLOGY

With regard to the local usage of sulfur, it is spoken of as a reducing agent, extracting oxygen from the tissues. According to Sutton and Sutton the therapeutic actions of sulfur are two fold: first, by its effect on the endothelial lining of the capillaries the caliber of the vessels is reduced, and the supply of blood to the part diminished; second, it hastens keratinization of the skin. Miller, in quoting Zunz, states that sulfur is changed in form on the skin, it reaches the cystine containing cells and is converted into hydrogen sulfide. In the presence of hydrogen sulfide soluble polysulfides are formed that liberate sulfur in the deep layers of the epidermis. Sulfur also reacts with the thionic groups normally contained in the deep epidermis, forming disulfides and hydrogen sulfide. These sulfides eventually become penta-thionic acid.

The actions of sulfur when applied locally are many. It is antiseptic, antiparasitic, and fungicidal. In dilute strength it is keratoplastic and astringent; in stronger preparations it is irritating and causes exfoliation of the epidermis. The therapeutic properties of sulfur largely depend on its conversion into thio-compounds, such as the formation of sulfurous and sulfuric acids on raw surfaces. It has been observed that sulfur ointment increases the sulfur content of the serum of normal persons by 87 per cent (87%) twelve hours after the application of 10 grams of the U.S.P. preparation. Colloidal sulfur largely overcomes the absorption handicap that has persistently confronted the ordinary form, because the physiological activity of sulfur increases with the fineness of subdivision. It enters into chemical combination with rapidity and ease, giving superior results wherever sulfur is indicated. Sulfur in colloidal solution produces hydrogen sulfide more rapidly than other forms. Colloidal sulfur has given gratifying results in the treatment of acne vulgaris, seborrhea, seborrheic dermatitis, sweat eruptions generally, rosacea, ringworm infections, bromidrosis, eczema marginatum, furunculosis, neurodermatitis, pediculosis, pruritus vulvae, psoriasis and scabies. "Of the many local remedies for seborrhea of the scalp, not one is more useful than sulfur."[6]

SUMMARY

A review of the literature dealing with the therapeutic actions and uses of sulfur and sulfur compounds has been made. References to a few of the important papers have been cited. Special treatment has been given to the subjects: colloidal chemistry; prevalence and distribution of sulfur in the body; daily requirements of sulfur by the body; metabolism of sulfur in the body; sulfur in detoxication, arthritis, pellagra, avitaminosis, diabetes mellitus and dermatology.

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16 North Twenty-Second Street.

Richmond—

October 3, 4 and 5

As President of the Richmond Academy of Medicine, I wish on behalf of our members to let you know how delighted we are that the Medical Society of Virginia is going to meet with us on October 3-5.

I can assure you that everything is being done to make the meeting one of the most attractive which we have ever had, but unfortunately upon you, chiefly, does the true success of the meeting depend. As hosts, we can prepare down to the last detail, but without your cooperation we can accomplish little.

In the July issue of the VIRGINIA MEDICAL MONTHLY, we have tried to tell you of some of the attractions which Richmond has to offer those who are coming, but, great as these are, this is not going to be what will attract you to Richmond in October.

The splendid program, with its attractive guest speakers, is going to be of the highest type, but to some even this is not going to make an appeal sufficiently strong as to cause them to leave home.

The large number of attractive exhibits, the reunion dinners, and various types of entertainment will naturally appeal to many others, but even these will not appeal to all.

Should there not be a greater appeal to the 1,800 members of our Society than the program, the exhibits, the meeting of friends, and general entertainment? Today, I feel there is. There never was a time in the history of our Society when there was a greater need for cooperation than there is today. Our profession is being assailed from all sides and there is not a doctor in Virginia who is not being affected by it. There are many problems which will have to be solved and, if they are to be solved correctly in Virginia, we are the ones who must do it. The future of medicine in Virginia will depend largely upon the way we can solve our problems today.

You can help your State Society in many ways if you will only come to Richmond in October.

KARL S. BLACKWELL, *President,*
Richmond Academy of Medicine.

Public Health Statistics

I. C. RIGGIN, M. D.
State Health Commissioner of Virginia

The report of the Bureau of Communicable Diseases of the State Department of Health for June, 1939, compared with the same month in 1938 follows:

	1939	*1938*
Typhoid and paratyphoid fever	28	49
Diphtheria	30	30
Scarlet fever	41	71
Measles	1,763	1,237
Meningitis	4	8
Poliomyelitis	2	5
Rocky Mountain spotted fever	12	10
Typhus fever	2	1
Undulant fever	2	5
Tularemia	3	3

SYPHILIS AND THE CONTACT CASE

One of the most important activities of the venereal disease control program of the Virginia State Department of Health is the epidemiological investigation of contacts of cases of syphilis in the early stages and the follow-up of patients delinquent from treatment. In all of the counties and cities of the State having full-time health service this valuable work is being performed.

In the epidemiological investigation of contacts, a full history is obtained regarding contact prior to and subsequent to infection from the original case. After this, a form letter stating that the person named has been recently exposed to a serious communicable disease and advising that he present himself either to his family physician or to the clinic for examination is sent to the contact. If the individual does not present himself within the specified time, a second letter is sent further impressing the fact that he has been thus exposed and urging more emphatically that he consult his physician. In the event that the contact comes to the clinic, he is examined and, if found to be infected, referred by the clinic to his physician for treatment.

However, if the letters are unheeded, the person exposed is visited and his exposure explained, without divulgence of the identity of the informant. The majority of these individuals present themselves for examination as a result of the letters. Nearly all come in after a visit and fuller explanation.

That this work is of importance cannot be overemphasized. It has been found that, for each one hundred original cases, between forty and fifty new cases, previously unrecognized as syphilis, receive treatment as a result of contact work. Furthermore, approximately one case is located for each original case—if we consider cases located that have been previously treated or diagnosed. It is also known that contact investigation of infectious cases results in bringing the greatest number of persons to treatment, and, in consequence, considering the money and time expended, is most effective as a control measure.

There are many physicians in the State who are investigating the contacts of the infectious cases in their practice and who are checking contacts other than the immediate familial ones in an attempt to bring these exposed individuals for examination. Many are reporting contacts not in their practices to the local health departments for investigation. These are reported to the health departments on the back of the case report card. As is customary, the case is reported by number, and the contacts prior to and subsequent to infection are listed in the space provided by name, address, color, sex, and age. In this system, the identity of the original case is not divulged, and a valuable service is rendered to those persons who have been exposed and, in turn, to the community at large, in that further spread is prevented when an infected individual is brought to treatment.

Another activity of importance is the follow-up work being done on the patient delinquent from treatment. This is of particular importance from a public health viewpoint when the case is delinquent in the early stages of syphilis. When the patient is delinquent in the late stages, it is of economic importance to the community to have him followed up. If delinquents are reported to the health department on the "Discontinued Treatment" notice, an attempt is made to locate them and to see that they return to treatment. This is accomplished by persuasion, if possible; where this fails, the Statute Laws of the State (Chapter 364, paragraph 5-a) provides for a drastic quarantine and imposes a penalty for violation of quarantine upon all infectious or potentially infectious cases. In this procedure, a notice is served to the delinquent individual—if necessary a visit is made to persuade him to return. If this fails, a quarantine notice is served and strict quarantine is enforced. This notice defines the area and limits of

the quarantine, stating that it will be enforced until satisfactory evidence is produced that the person is receiving treatment from a duly licensed physician. It is rare that delinquents do not return to treatment upon receipt of quarantine notification, and prosecutions for violation of quarantine are seldom necessary. This service returns the patient to treatment and prevents community spread by careless and negligent individuals.

Truth About Medicine

In addition to the articles previously enumerated, the following have been accepted by the Council on Pharmacy and Chemistry of the American Medical Association:

Lederle Laboratories, Inc.
Immune Globulin (Human)—Lederle.
Tablets Ascorbic Acid—Lederle, 0.025 Gm.

New and Nonofficial Remedies

The following products have been accepted by the Council on Pharmacy and Chemistry of the American Medical Association for inclusion in New and Nonofficial Remedies:

Sulfapyridine—Lederle.—A brand of sulfapyridine—N.N.R. (*The Journal*, May 6, 1939, p. 1831). It is supplied in the form of tablets, 0.5 Gm. (7.7 grains). Lederle Laboratories, Inc., Pearl River, N. Y.

Tablets Sulfanilamide, 5 grains—The Upjohn Company.—Each tablet contains sulfanilamide (New and Nonofficial Remedies, 1939, p. 463) 5 grains. The Upjohn Company, Kalamazoo, Mich.

Tablets Sulfanilamide, 7½ grains—The Upjohn Company.—Each tablet contains sulfanilamide (New and Nonofficial Remedies, 1939, p. 463) 7½ grains. The Upjohn Company, Kalamazoo, Mich. (*J. A. M. A.*, June 24, 1939, p. 2603).

Accepted Devices for Physical Therapy

The following devices have been accepted by the Council on Physical Therapy of the American Medical Association for inclusion in its list of accepted devices for physical therapy:

Aloe Short-Wave Unit, Type CSC.—This unit is recommended for medical and minor surgical procedures. It is similar to the Council accepted Aloe Short-Wave Diatherm, Type CSW (*The Journal*, September 4, 1937, p. 793) except for the addition of an inductance cable outlet, thus providing for coil, cuff and pad technics. The unit was tried out clinically and was found to give satisfaction when used for cuff and coil technic. A. S. Aloe Company, St. Louis, Mo. (*J. A. M. A.*, June 3, 1939, p. 2275).

Propaganda for Reform

A New Dietary Factor.—About three years ago Day, Langston and others of the University of Arkansas, placed monkeys on a presumably adequate diet containing all known vitamins. This diet consisted of a mixture of casein, polished rice, ground whole wheat, cod-liver oil, ascorbic acid, salt mixture and sodium chloride. All monkeys fed this diet developed anemia, leukopenia, gingivitis, diarrhea, anorexia and loss of weight. Death invariably occurred in from one to three months. These investigators then tested the effects of the addition of nicotinic acid to their routine deficiency diet. The nicotinic acid had no demonstrable effect on the pellagra-like oral lesions in these animals. In later tests the Arkansas physiologists found that 1 mg. of riboflavin added to the daily diet will not prevent the development of pellagra in monkeys, nor will a combination of nicotinic acid, riboflavin and thiamin appreciably affect the course of this deficiency disease. If the daily deficiency diet is supplemented by 10 Gm. of dried brewers' yeast, however, or by 2 Gm. of liver extract, normal body growth and a normal blood picture are maintained over long periods. They conclude from these results that monkeys require some factor contained in yeast or in liver extract in addition to the factors commonly recognized as a part of the Vitamin B complex. For this unknown nutritional factor they tentatively suggest the name "Vitamin M." Attempts to isolate and identify the new antipellagra "vitamin" are now in progress in their laboratory. (*J. A. M. A.*, April 1, 1939, p. 1258.)

A Study of the Promiscuous Use of the Barbiturates: Their Use in Suicides.—The Board of Trustees of the American Medical Association requested the Council on Pharmacy and Chemistry to make a study of the promiscuous use of barbiturates, particularly with reference to the dangerous use of these products by the public. The Council invited Dr. W. E. Hambourger of Western Reserve University to draw up a report. The Council considered Dr. Hambourger's report and authorized its publication. The following is a summary of Dr. Hambourger's study: 1. More than 1,200,000,000 grains of barbituric acid derivatives was sold in the United States in 1936. 2. The total number of suicidal deaths by the barbiturates in the United States in 1936 was probably close to 300. The probable number in 1937 may have approached or even exceeded 400. 3. For the five years 1932-1936 the national incidence of suicides by barbiturates represents 4.2 per cent of all poisons (except gases) and 0.66 per cent of all methods used for suicide. 4. In seven large cities and their associated counties, for the decade 1928-1937, barbiturates represent 8.1 per cent of suicides by all solid and liquid poisons and 1.25 per cent of all methods used for successfully committing suicide. 5. The incidence of suicides by barbiturates is nearly twice as high in large cities as in the country as a whole, ranging from 2 per cent in St. Louis up to 16.7 per cent in Boston. 6. The number of suicides by barbiturates has shown a definite upward trend during the past decade, especially marked since 1933, although the frequency of suicides by liquid and solid

poisons and of total suicides have both declined since 1933. (*J. A. M. A.*, April 8, 1939, p. 1340.)

Sulfapyridine.—After careful study, the U. S. Food and Drug Administration has granted the right to manufacturers to distribute sulfapyridine in interstate commerce under the stipulations of the act dealing with new drugs. During the period when sulafpyridine was under consideration, *The Journal* and the Council on Pharmacy and Chemistry made every effort to obtain essential information concerning its usefulness in the treatment of various types of pneumonia and, in so doing, has consulted approximately 100 physicians who have replied to inquiry giving the details of their experiences with the drug. The replies received indicate that it is essential wherever possible to type each case of pneumonia before this drug is administered, because it has been reported by a number of investigators that there are cases of pneumonia which do not respond to this drug and have subsequently responded to the specific antiserums. The Council reports that all of these observations lead to the suggestion that, while there is much to be learned about the exact place of sulfapyridine in the treatment of pneumonia, it appears to be a very useful measure in many cases when properly employed. The facts also suggest considerable caution in its use until such time as more evidence is available of its usefulness and safety. It remains to be determined just how effective it is and just how well it will compare with antiserum in various epidemics or over a course of years in various types of pneumococcic infections. The Council on Pharmacy and Chemistry has voted to accept sulfapyridine for inclusion in New and Nonofficial Remedies (*The Journal*, May 6, 1939, p. 1831) and to proceed with the consideration of the submitted brands of the drug. (*J. A. M. A.*, May 6, 1939, p. 1830.)

Book Announcements

Priests of Lucina. The Story of Obstetrics. By PALMER FINDLEY, M.D., F.A.C.S. Boston. Little, Brown and Company. 1939. Octavo of xiv-421 pages. Cloth. Price, $5.00.

There has long been a need for such a delightful, gossipy history of obstetrics. In fact there is no history of obstetrics in English. Herbert Spencer has given us "The History of British Midwifery", Herbert Thoms "Chapters in American Obstetrics" and Edwin Jameson a "Booklet" on the history of gynecology and obstetrics. With the increasing interest of lay men and lay women in obstetrics, Palmer Findley's book should find a host of readers, both professional and otherwise. He gives us interesting sketches of the men who have played important roles in the development of the art of midwifery from Hippocrates to Whitridge Williams. The reader learns how many of the misconceptions we meet today arose from the beliefs of the teachers of the past: that a seven months' fetus is more likely to survive than an eight months' one; that stoppage of the lochia causes puerperal fever; or that you can diagnose the sex from the way the mother carries the fetus, etc.

I am glad that Albertus Magnus was included among the Priests of Lucina, but was disappointed that his description of the repair of a ruptured perineum was not mentioned. It is also disappointing that our author did not treat more critically the gynecological knowledge of the ancient Greeks. Their knowledge of anatomy was vague and their nomenclature was confusing. Goodell tells us that they used the same word for uterus and vagina, so that when they speak of laceration of the cervix, it is not clear just what the lesion was. Dr. Findley who is both a scholar and a master gynecologist, missed a golden opportunity in not clearing up this vexing subject.

There are a few errors that the critic feels obliged to point out. On page 209 William Smellie and William Hunter are called two *Lancashire Scots* instead of Lanarkshire. The printer evidently was more familiar with English geography than with Scottish. One would gather from Chapter XVII that Dr. James Lloyd of Boston and Dr. William Shippen, Jr., of Philadelphia were the only male midwives in America before the Revolution. No mention is made of Dr. John Moultrie of Charleston nor of William Watkins, surgeon and man-midwife, who was living in Port Royal, South Carolina, in 1737. Credit is rightfully given to Max Sanger for modernizing the cesarean operation but no mention is made of the influence on Sanger of the early American operators who first sutured the uterus. The author states that the first successful cesarean section in the United States was performed by a young girl fourteen years of age upon herself in 1822. As a Virginian I resent the ignoring of Dr. Jesse Bennett's operation in the Valley of Virginia in 1794.

The chapter on puerperal fever is a most excellent one. I wish, however, it had been extended to include the newer work on droplet infection and the benefit of face masks in prophylaxis. In fact the whole book is well written. The only poor section is that on James Platt White who introduced clinical teaching in obstetrics. This innovation produced a storm of protest. Just what connection the suit for

libel of "The people versus Horatio N. Loomis" had with James Platt White is not clear from the text. The attorney for the defense argued that "it was not only a startling and bestial innovation, but without a particle of utility." A verdict however was returned in favor of the defendant. In the next paragraph we learn that Dr. White was ultimately vindicated.

The book should be read by all who are interested in obstetrics.

M.P.R.

Medical State Board Examinations. Topical Summaries and Answers. An Organized Review of Actual Questions Given in Medical Licensing Examinations Throughout the United States. By HAROLD RYPINS, A.B., M.D., F.A.C.P., Secretary, New York State Board of Medical Examiners; Member, National Board of Medical Examiners; Former President Federation of State Boards of Medical Examiners of the United States; etc. Fourth Edition, Revised. Philadelphia. J. B. Lippincott Company. 1939. Octavo of 448 pages. Cloth. Price, $4.50.

The author of this book is rich in experience, particularly as it relates to state board medical examinations, and so this text is of more than ordinary interest. The book is very evidently not a pocket encyclopedia or a quiz compound, but represents a systematized review of medicine based on the premise that the reader has a much greater breadth of knowledge than the contents of the book. The preface deserves special praise. Here the author discusses in fine fashion the relationship between medical schools and state boards. One of the most interesting statements to the reviewer was the following:

"It is evident that the examining boards are slowly realizing that medical schools are in better position than themselves to test the student's academic or encyclopedic knowledge of such subjects an anatomy, chemistry and bacteriology; that such testing may be safely left in the hands of medical faculties; and that examining boards should limit themselves to inquiring into the ability of the medical graduate to apply such knowledge clinically."

In chapter I, headed "Personal Foreword to the Candidate," good, sound advice is given to the young graduate who is applying for licensure. It would be well if this chapter were read to all graduating classes in medicine who are to face state board examinations.

After this personal foreword there follow discussions in a very attractive style of the more salient and important points of interest in chapters devoted to anatomy, physiology, chemistry, bacteriology, pathology, hygiene and preventive medicine, obstetrics and gynecology, medicine, and surgery. The statements are as a rule concise and in keeping with modern facts and opinions. At the end of each chapter there is a list of pertinent questions bearing on the subject of that particular chapter. It is a book that but for one major fault could be very useful and interesting to those who would like to refresh their memories and bring their medical thoughts up to date. The author states that he has purposely omitted technical questions of procedures and hence has omitted prescription writing and materia medica.

Now the fault! It is inconceivable that a book of this type could be presented without a section on pharmacology; but this is the case. Can it be that the author feels that this subject warrants no such recognition as is given its handmaids? The reviewer had hoped that he had sometime ago encountered the last flutterings of the anti-drug propaganda that began some fifty years ago. Probably no subject in the medical curriculum is growing so rapidly as pharmacology, given even greater impetus within recent years by the renewed interest in chemotherapy and by the introduction of the various hormone preparations. It is unfortunate that at a time when students and practitioners should know more of the fundamentals of drug action, and should be weaned away from further tutelage by detail men, that an authority such as Dr. Rypins should so completely ignore it. Fortunately the cudgels are being taken up for pharmacology by many of the more enlightened in medical education; as an instance of this one has but to read the *Rockefeller Foundation Review* for 1938. Incidentally the reviewer is a teacher of pharmacology.

H. B. HAAG, M.D.

Virginia Medical Monthly

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Editorial

A Professor Comes to the University.

Eugene M. Landis, M.A., M.S., Ph.D., M.D., F.A.C.P., formerly Assistant Professor of Medicine and Research Associate in Pharmacology at the University of Pennsylvania, by virtue of a recent action of the Board of Visitors of the University of Virginia succeeds the late Dr. J. C. Flippin, and becomes Professor of Internal Medicine, Head of the Department of Medicine on a full time basis, and Chief Physician to the Hospital and Clinic of the University of Virginia.

A review of Professor Landis's qualifications is impressive. A holder of four degrees from the University of Pennsylvania and of an honorary degree from Yale University, he comes to Virginia with an array of productive research and published papers that would do credit to a much older man. His interest has hitherto been chiefly in the peripheral vascular system. Beginning in the Department of Physiology at the University of Pennsylvania with a study on capillary pressure and permeability, his investigations were continued in London under Sir Thomas Lewis with a study of capillary physiology and peripheral vascular disease, and a final work on capillary physiology and edema was completed with August Krough in Copenhagen.

The permanent and fundamental nature of his contributions to experimental and clinical medicine is pretty generally recognized. The fact that he delivered the Hatfield Lecture in Philadelphia and the Harvey Lecture in New York the same year, and later the Noble Wiley Jones Lectures in Portland, testifies to the recognition he has already received.

Professor Landis has been called to a chair previously occupied by a long line of distinguished physicians, extending from Dunglison through Magill, Griffith, Howard, Harrison, Dabney, Buckmaster and Davis to the late Dean Flippin. It is worth noting that his name has long been identified with Philadelphia medicine and that the University of Virginia is following an old tradition in turning to the Quaker City to fill its chair of medicine. The first four occupants of this position were connected in one way or another with medical teaching in that extraordinary center of early medical culture. Robley Dunglison left the University of Virginia in 1833 to become Professor of Medicine at Jefferson Medical School. Alfred T. Magill was a graduate of the University of Pennsylvania. Robert E. Griffith, before coming to Virginia, taught medicine in Philadelphia after graduating in medicine there, and Henry Howard, who succeeded him in Charlottesville, also had his diploma from the University of Pennsylvania.

We in Virginia welcome to the State a man who has already achieved so much and whose reputation gives promise of further productive investigation and teaching.

Sulfanilamide et al Under One Cover.

In all the history of medical science there has probably never been offered to the profession a drug equal to sulfanilamide, sulfapyridine and their allied compounds. Quinine is practically limited to malaria and arsphenamine to syphilis, but the group of sulphur compounds which we are now discussing is effective over a range of such widely differing infectious diseases that no one has as yet explored the full extent of their usefulness.

It has now been six years since Dr. Foerster reported upon "Sepsis im Anschluss an ausgedehnte Periporitis. Heilung durch Streptozon." During this time an enormous literature on the subject of sulfanilamide has accumulated, and physicians all over the world have prescribed tons of the new drug. While clinical application has been widespread, much remains to be discovered concerning the fundamental mechanism of the treatment as it acts upon both the host and the infecting organism. That the drug is toxic, that knowledge concerning its pharmacology is incomplete, that laboratory facilities for following its concentration in the blood have not been generally available, that evidence of its injury to the host is frequent, that the technique of administration demands keen clinical judgment,—all of these facts have been too lightly regarded by the general run of the medical profession. For these reasons a monograph such as the Macmillan Press has just issued under the title: *The Clinical and Experimental Use of Sulfanilamide, Sulfapyridine and Allied Compounds,* is warmly welcomed. P. H. Long and E. H. Bliss are the authors.

In spite of being a little too long, a trifle repetitious, and in spots lacking in clarity, the book appears to present most of the facts in the case. Inside its covers the seven sulphur benzene derivatives which have had clinical trial in this country and in Europe are listed, and their structural formulas given. Here is the fascinating history of this epochmaking discovery and the story of its tardy acceptance,—tardy especially in this country. Here the chemotherapy of experimental bacterial infections is discussed and the pharmacology and experimental toxicity of these compounds are described in detail, along with their mode of action, their clinical application, and their toxic manifestations in patients.

Most physicians have already had a hand at prescribing one or another of this group of drugs, and most physicians will want to have a look at this book. It may not be necessary to own it because almost before it can be read attention may be focused upon other, as yet unexplored, phases of the new therapy.

A Record of Accomplishment.

As was predicted by Surgeon General Parran a year or more ago, we are beginning to feel a reaction to the drive and publicity against syphilis. There is less sound and fury than there was a while ago. And yet the work goes on in spite of the stillness in the air. It must go on until syphilis—not the French Disease, not the Neapolitan Disease, not *lues venenata,* but the American Disease—is brought under some sort of control.

Typical of the kind of antisyphilitic campaign which counts is the work being done by the Venereal Control Officer in the City of Richmond. Dr. Francis Upshur's annual report to the Director of Public Welfare shows what a planned approach can accomplish among industries, hospitals, syphilologists, obstetricians, recruiting officers of the Navy, Army and Marine Corps; how infractions of the law may be prevented; how reporting of cases can be increased; how a follow-up of infected persons who have come to Richmond to live may be effectively carried out. The report reflects the work of an energetic, tactful and enthusiastic officer who has succeeded in enlisting public support and is daily winning more of the confidence and cooperation of the people he serves.

Rankin and Graham's Book.

Cancer of the Colon and Rectum, by Rankin and Graham, a well printed and copiously illustrated monograph fresh from the press of Charles C. Thomas, Baltimore, offers the latest information in its specialized field, completely yet succinctly. The fact that 15 per cent of all cancers involve the lower intestinal tract and that almost half of these are in the rectum, justifies the book's 355 pages. Buttressed by an adequate preliminary discussion of anatomy, physiology, pathology, etiology, incidence, symptoms and diagnosis, the body of this manual is quite naturally devoted to a discussion of treatment. Operability, prognosis, choice of operation, pre- and post-operative treatment, and the actual operative procedures are fully discussed. A chapter on roentgenology is conservative in its point of view.

Are you dealing with carcinoma of the colon or rectum? This book will help you to decide. What

does surgery have to offer? What kind of surgeon should be called in? What are the patient's chances in the surgeon's hands? This manual answers these questions. Having read it, one is left with the impression that in dealing with cancer of the colon and rectum one is dealing with a disease whose treatment is primarily surgical, that half the cases of it are not seen until they have become inoperable, that many more would be hopeless but for the skill that those trained in this particular field have been able to master in recent years, and that this type of surgery should undoubtedly be reserved for those whose experience and results justify their claim to be specialists.

The junior author of the book, A. Stephens Graham, was born in Virginia, educated at the University, trained by the Mayos, and is now practicing surgery in Richmond. The chapter on roentgenology was contributed by Fred Hodges, also of Richmond.

The Health of Primitive Man.

Adolph H. Schultz in the *Bulletin of the History of Medicine* for June, 1939, has presented striking figures to show the incidence of disease and injury in wild apes. In the wild monkeys of Panama he claims that tertian-like malaria parasites associated with splenic enlargement were found in 29 per cent of the cases examined, microfilaria in 92 per cent, and a large trypanosome in 42 per cent. In the gibbons of Northern Siam filariid worms were found in a large majority of cases investigated. Chronic arthritis was discovered in fifteen of nineteen gorillas, and in two of forty-one orang-utans. Dental disease is said to be particularly prevalent among such animals, alveolar abscesses occurring in 62 per cent of the orang-utans, in 59 per cent of the gorillas and in 58 per cent of the chimpanzees. Carious teeth occurred in a high percentage of the older animals and pyorrhea was also common. A high incidence of bony fractures is said to obtain in wild apes. In an examination of 262 specimens of humerus, radius, fibia, tibia and clavicle, there were 9 per cent of fractures. In some of these the fractures were multiple and yet many of them healed with the bones in excellent position and with little shortening.

The author of this paper assumes that these same diseases and injuries affected the primates thousands of years ago and contends that it is not unreasonable to assume also that they plagued man "in the ages during and after which man separated from the common ancestral stock." As there seems to be little chance of discovering much evidence concerning the diversity and prevalence of the diseases and injuries of primitive man through the restricted study of fossil remains, Dr. Schultz thinks that the study of the antiquity of human disease is fostered by these investigations of pathological processes among the primates. He interprets the facts as seeming to prove that human disease has not become more frequent or more widespread with the advance of civilization and that disease among animals is not essentially a penalty of captivity.

Licensed Subsidiary Nurses Again.

Under the caption *Licensed Subsidiary Nurses* the following statement was made in these columns last month anent the graduation of such nurses from Sheltering Arms Hospital:

"It is understood that these are the first nurses of this type to be graduated from any institution in the State of Virginia. They, therefore, represent a new departure and one which we believe meets a long standing need."

It has since been brought to our attention that the credit for first producing this type of nurse in the State should go to the Westbrook Training School where since 1925, a total of 150 such nurses have been graduated. For a number of years these subsidiary nurses, or nursing attendants, have been licensed by the State of Virginia. Some of them have been absorbed by Westbrook Sanatorium, others have been employed in the King's Daughters Hospital in Staunton, Virginia, in the Sheltering Arms Hospital, the Home for Incurables, Pine Camp and the Crippled Childrens' Hospital in Richmond, as well as in private duty. The Westbrook Training School for Nursing Attendants was organized by Miss Louise Moss (now Mrs. James H. Royster), as a fifteen months' course, but it was expanded in 1936 to cover eighteen months, six months of which were given at the Sheltering Arms Hospital in Richmond.

What Westbrook has done, what the Sheltering Arms and several of the State hospitals are beginning to do, other hospitals in Virginia can also do. It is hoped that a larger number of nurses of this type of training will soon be available. The system of annual relicensing which now prevails in Virginia offers the guarantee of efficiency which is necessary for their more general employment.

Department of Clinical and Medical Education
of the
Medical Society of Virginia

Internal Medicine.

LYNCHBURG COURSE

As was announced in a previous issue of the MONTHLY, a postgraduate course in internal medicine was offered in Lynchburg during April, May, and June at the request of the Lynchburg Academy of Medicine. Instructors for the course came from the Medical College of Virginia and the University of Virginia Medical School. Meetings were held in the Memorial Hospital on Friday evenings. The interest, as measured by comments from doctors attending and the average attendance, was all that could be desired. This was due in considerable measure to the initiative taken by the local society and the preparations made by the local committee consisting of Dr. Ernest G. Scott, chairman, Dr. John Hundley and Dr. David P. Scott.

The following doctors attended one or more of the meetings:

Dr. W. C. Adkerson
Dr. H. P. Brown
Dr. H. C. Brownley
Dr. Roosevelt Cafarelli
Dr. R. D. Caldwell
Dr. H. E. Clark, Massies Mill, Va.
Dr. J. P. Clark
Dr. R. H. Cross, Concord, Va.
Dr. J. W. Davis, Jr.
Dr. J. W. Devine
Dr. John Devine, Jr.
Dr. Powell G. Dillard
Dr. Porter B. Echols
Dr. J. R. Gorman
Dr. E. S. Groseclose
Dr. C. W. Haden, Evington, Va.
Dr. Mary Harley, Sweet Briar, Va.
Dr. E. A. Harper
Dr. R. N. Hillman, Jr., Amherst, Va.
Dr. F. R. Hopkins
Dr. J. T. Hundley, Jr.
Dr. P. G. Hundley
Dr. J. Paul Kent, Altavista, Va.
Dr. S. G. Miller, Piney River, Va.
Dr. Carleton Moorman, Altavista, Va.
Dr. F. M. Morrison
Dr. James Morrison
Dr. E. F. Neal, Altavista, Va.
Dr. S. E. Oglesby
Dr. F. O. Plunkett
Dr. B. F. Randolph, Arrington, Va.
Dr. J. H. Rawlings
Dr. Carol M. Rice, Sweet Briar, Va.
Dr. B. A. Rice, Forest, Va.
Dr. H. L. Riley, Jr.
Dr. T. E. Rucker
Dr. W. V. Rucker, Bedford, Va.
Dr. E. M. Sandidge, Amherst, Va.
Dr. John R. Saunders
Dr. D. P. Scott
Dr. E. G. Scott
Dr. R. M. Taliaferro
Dr. A. W. Terrell
Dr. D. M. Thomasson
Dr. F. L. Thurman, Buena Vista, Va.
Dr. M. T. Vaden, Buena Vista, Va.
Dr. W. L. Williams, Brookneal, Va.
Dr. Edward F. Younger
Dr. William Weaver, Colony, Va.

BUCKINGHAM COUNTY

At the request of the newly-formed James River Medical Society a short course was held at Arvonia for the period of May 10 to June 7. The program for this course was printed in the June issue of the MONTHLY. The secretary of the society, Dr. E. J. Haden, reports that the course was very much worthwhile in the opinion of those attending. The following doctors enrolled for the course:

Dr. J. N. Dudley	Dr. T. E. Patteson
Dr. Perkins Glover	Dr. N. P. Snead
Dr. E. J. Haden	Dr. S. W. Selden
Dr. J. E. Haynesworth	Dr. A. C. Whitley
Dr. E. B. Nuckols	Dr. J. H. Yeatman

In addition to the above list a number of doctors attended one or more meetings.

At the request of the Buchanan-Dickenson Medical Society a speaker was provided for their meeting on June 21. Dr. Wellford C. Reed, the speaker, discussed "The Use of Quinidine and Digitalis in the Treatment of Heart Disease."

NEW COURSES

A few more courses may be offered during the summer and early fall upon request of local societies. Requests should be addressed to the Executive Secretary.

G. B. ZEHMER,
Executive Secretary.

Proceedings of Societies

The Dickenson-Buchanan County Medical Society

Met at Grundy on June 21, with Dr. W. A. Carr, Harman, presiding. There were nineteen members present. After dinner, Dr. J. P. Williams, Richlands, gave a film on "The Heart". Dr. Wellford Reed, Richmond, was the guest and spoke on "The Use of Digitalis and Quinidine in Heart Conditions".

Officers elected for the coming year are: President, Dr. P. Q. Daniel, Big Rock; vice-president, Dr. J. C. Trivett, Page; and secretary-treasurer, Dr. T. C. Sutherland, Haysi (re-elected). Delegates and alternates to the State Society meeting were also appointed.

The Patrick-Henry Medical Society

Held its quarterly meeting in Martinsville on July 14. In the absence of the president, Dr. J. A. Shackelford, the meeting was presided over by the secretary, Dr. R. H. Walker. The guest speaker was Dr. Hugh H. Trout, Roanoke, president-elect of the State Society, who spoke on the work of the American Medical Association and the Medical Society of Virginia and its relation to the practicing physician. Delegates and alternates to the State meeting in Richmond were elected.

The Manchester Medical Society

Was entertained by Dr. and Mrs. J. Blair Fitts at their home at Drewry's Bluff, Tuesday evening, June 13. Dr. James Tucker presented a paper on "Fractures about the Hip", and Dr. Manfred Call, III, guest speaker, discussed "Sulfapyridine in Pneumonia".

The following officers were elected for the ensuing year: President, Dr. J. Blair Fitts; vice-president, Dr. Richard A. Bowen; and secretary-treasurer, Dr. A. S. Hurt, Jr.

As the Manchester Medical Society was in existence for sometime before that section was annexed to Richmond as South Richmond, the doctors now living on the south of the river and former residents there have continued their society and have a live organization.

News Notes

Medical Society of Virginia — Richmond Meeting.

We are rapidly nearing time for the seventieth annual meeting of the Medical Society of Virginia in Richmond, October 3, 4 and 5, and we count on a large attendance. The local committee, of which Dr. Roshier W. Miller is general chairman, has been very active, and all details are well in hand. Mrs. James K. Hall, with her excellent committee, has planned attractive entertainment for the ladies, so doctors are urged to bring their wives and daughters.

There are several innovations this year. These include having the meeting of the House of Delegates on Tuesday evening in place of the general open meeting heretofore held at that time. The first of the scientific sessions is to be on Wednesday morning, at which time, also, there will be a guest speaker. Two other guest speakers will address other sessions. That evening will be open for alumni and other special meetings and dinners. The round tables have been changed from Wednesday to Thursday afternoon, and the subscription dinner that evening will close the meeting.

In addition to the usual technical exhibits, there will be the largest display of scientific exhibits in the history of the Society, a number of these being in the form of demonstrations at special hours. The number of papers to be presented has been reduced so as to make it possible for members to visit these.

You will feel repaid for attending this meeting. Come, see for yourself!

Married.

Dr. Arthur LaGrange Van Name, Jr., Center Cross, and Miss Grace Alma Cluverious, Little

Plymouth, in July. Dr. Van Name is a graduate of the Medical College of Virginia, in 1936.

Dr. John D. Hamner, Jr., class of '35, Medical College of Virginia, and Miss Evelyn Michelle Shepherd, both of Richmond, June 24. Dr. Hamner is now connected with the health work of Henrico County.

Dr. John Daniel Call, son of the late Dr. and Mrs. Manfred Call of Richmond, and Miss Alice Elizabeth La Plant, Denver, Colo., March 29. Dr. Call is a graduate of the Medical School of the University of Virginia in 1938 and recently completed an internship at the Virginia Mason Clinic in Seattle. He is now resident physician at the Riverton Sanitorium in Riverton, Wash.

Dr. Sidney Grey Page, Jr., and Miss Maysville Jane Owens, Cumberland, Md., June 24. Dr. Page graduated from the Medical College of Virginia in 1938 and is serving an internship at the Peter Bent Brigham Hospital in Boston.

Medical College of Virginia News.

Dr. William B. Porter, professor of medicine, attended the annual meeting of the West Virginia Medical Association at White Sulphur Springs, W. Va., July 10-12, speaking before the general session, the section on heart diseases, and the section on internal medicine. At the same time he spoke to the West Virginia alumni of the college at a luncheon meeting.

Dr. Clair R. Spealman, associate in physiology and pharmacology, has been granted a leave of absence for the session 1939-40 to do special work in physiology at the Laboratoire Maritime, Concormeau, France. Dr. Paul Larson has been appointed to substitute for Dr. Spealman. Dr. Larson received his A.B. degree from the University of California in 1930 and his Ph.D., from the same university in 1934. He has been instructor in physiology at the Georgetown Medical School.

Dr. William B. Porter, professor of medicine, Dr. Frank L. Apperly, professor of pathology, Dr. Harvey B. Haag, professor of pharmacology, and Dr. Rolland J. Main, associate professor of physiology, assisted in giving the National Board examinations at Duke University, Durham, N. C., last month.

Mr. Hans Jelinek has been employed by the college as medical illustrator. Mr. Jelinek has acted as medical illustrator for the Anatomical Institute of Vienna, the Psychiatric and Neurological Clinics and the Neurological Institute of the University of Vienna.

Dr. W. G. Crockett, professor of pharmacy, was awarded the honorary degree of Doctor of Science by Hampden-Sydney College last month.

The portrait of Dr. David Hunter Tucker, former dean and professor of the theory and practice of medicine, was unveiled with appropriate exercises on June 14. Dr. Beverley R. Tucker, a great nephew, presented the portrait. During the exercises Dr. Stuart McGuire told of the early associations of his father, Dr. Hunter McGuire, with Dr. Tucker.

Mr. David I. Farnsworth has joined the full-time faculty of the college effective July 1, 1939, as associate in anatomy. Mr. Farnsworth received his B.A. degree from Nebraska Wesleyan University in 1924, his master of science from St. Louis University in 1928, and his bachelor of medicine from Louisana State University last month.

The American Tobacco Company has continued its grant of $5,000.00 for the year 1939-40 for research in the department of pharmacology.

An Excellent Record.

Dr. R. D. Garcin of Richmond, Medical Director at the Masonic Home of Virginia, reports that they have just completed the annual physical check-up on the children at that home and for the sixth consecutive year the Wassermann test on every child was found to be negative. The children range in age from five to eighteen and he feels it is a unique record.

Dr. M. M. Pinckney

Has recently been appointed chairman of the first-aid committee of the Richmond Chapter, American Red Cross. He succeeds Dr. F. P. Fletcher, Jr., who will continue to serve on the committee as technical adviser.

Dr. James B. Pettis,

Clinical director of Western State Hospital, Staunton, has been appointed an associate professor of neurology and psychiatry at the University of Virginia. He will visit the University once a week for lecture and consultation purposes in the neuro-psychiatric clinic.

The National Society for the Prevention of Blindness

Will hold its annual conference in New York, October 26-28, with headquarters at the Astor Hotel.

Arrangements will be made for extending the facilities of the Society's offices at Rockefeller Center to all visitors.

Dr. Edward V. Brush, Jr.,

Has located for general practice in Lexington. He is a graduate in medicine of the University of Virginia, class of '37, and served an internship at the Norfolk General Hospital and a residency at the Leigh Memorial Hospital.

Dr. Paul V. Davis

Has been employed by the board of directors of the Fauquier County Hospital, Warrenton, for coordinating and directing the medical work of the hospital, organizing and directing clinics and directing charity and emergency work for a period of six months. Dr. Davis is a graduate of Tufts College Medical School, Boston, in 1935.

Dr. Francis N. Taylor,

Petersburg, was recently elected a director of the Lions Club of that city, for a term of two years.

American Board of Obstetrics and Gynecology.

In the last issue of the MONTHLY, it was announced that the next Group B, Part I, examination of this Board would be held on December 2, 1939. This date has been changed to January 6, 1940, but the applications for admission must be on file in the Secretary's office not latter than October 4, as previously stated. The application fee was given as $15.00 and the examination fee $75.00. The latter figure should have been $85.00. For further information, address Dr. Paul Titus, Secretary, 1015 Highland Building, Pittsburgh (6), Pennsylvania.

Tuberculosis and Tonsils.

According to Bordley, J., III, and Baylor, John W., Bull. Johns Hopkins Hosp., 1938, 63. sixty-one individuals from whom tuberculous tonsils or adenoids had been removed in the years between 1912 and 1920 were investigated in 1935 at the Johns Hopkins Hospital. Of the forty-five who were less than fourteen years of age when the operation took place but one had died from tuberculosis and forty-two were alive and well. Of sixteen cases who were past the age of fourteen more than half had suffered from pulmonary tuberculosis of the adult type. Incomplete examinations at the time of operation made it impossible to determine in how many cases the disease was already present in this older group. What did seem apparent was that after removal of the tuberculous focus, the children under fourteen rarely showed progressive tuberculosis of the adult type.

The American Congress of Physical Therapy

Will hold its 18th annual scientific and clinical session September 5-8, at Hotel Pennsylvania, New York City. Preceding these sessions the Congress will conduct an intensive instruction seminar in physical therapy for physicians and technicians—August 30-September 2, inclusive.

The instruction seminar should prove of unusual interest to physicians and technicians. The clinics which comprise half of the schedule make this course outstanding for its practical value. As in the past outstanding clinicians and teachers will participate. Registration is limited to 100 and is by application only. For information concerning seminar and preliminary program of convention proper, address American Congress of Physical Therapy, 30 North Michigan Avenue, Chicago.

While the convention proper will have numerous special program features of scientific interest, the added attraction of the World's Fair should make it extremely worth while for every physician to come to New York and spend a most profitable vacation.

Dr. I. C. Evans,

Class of '38, Medical College of Virginia, who interned during the past year at the Municipal Hospital in Tampa, Fla., is now connected with the Department of Pathology at the Charity Hospital in New Orleans, La.

To Locate in Dillwyn for Practice.

Dr. Hubert Dinwiddie Crow and Dr. Garland Dyches, both of the class of '38, Medical College of Virginia, located, August 1, in Dillwyn where they will be associated in general practice. Dr. Crow has been serving an internship at the Hospitals of the Medical College and Dr. Dyches has been at St. Luke's Hospital, Richmond.

Dr. Copeland Bowers,

Formerly of Dunbar, has located at 713 West Sycamore Street, Kokomo, Ind., for practice.

"You Can End This Sorrow"

Is the title of another U. S. Public Health Service folder in its venereal disease series, designed to emphasize the importance of early examination and treatment in every pregnancy. Copies are available

for one dollar per hundred from the Superintendent of Documents, Washington, D. C. Single copies are five cents.

Dr. James McLean Rogers,

Who, with his family has been on furlough in this country for nearly a year, left Richmond the latter part of July to resume his work at the Alexandra Hospital in Soonchun, Korea, under the auspices of the Presbyterian church. They took the trip by automobile to the Pacific coast, visiting many places of interest en route. Dr. and Mrs. Rogers, accompanied by two of their children, expect to sail for Korea on September 1, the older son returning to study in Virginia.

Associated in Practice.

Dr. A. L. Herring, Richmond, announces the association of Dr. W. Fitzgerald Cavedo in the practice of medicine, surgery and obstetrics, beginning July 1. They have their offices at 401 West Grace Street, this city.

Dr. W. R. Weisiger,

Richmond, junior past grand patron of the Grand Chapter of Virginia of the Order of the Eastern Star, recently was guest speaker at a flag ceremony of the South Hill Chapter.

Dr. J. B. Harvie Waring,

Cincinnati, has recently returned home after a trip to southern Georgia and Florida, where he conducted an instruction clinic in the suction method of removing tonsils. He was accompanied by his son and two doctors from Ohio. Dr. Waring visited in Richmond en route home.

Dr. Kenneth N. Byrne,

Medical College of Virginia, class of '37, has located in Lexington where he will be engaged in general practice, and will also do pneumothorax work for the health department. He interned at the Chesapeake and Ohio Hospital in Huntington, W. Va., and at the Marine Hospital at Key West, Fla., later training in chest work, for three months, at Catawba Sanatorium.

Dr. and Mrs. Byrne also announce the birth of a daughter, Mary Edith Dolores, in June.

Appointments for Health Departments.

Dr. Paul W. Bowden has been appointed health officer of Southampton County to succeed the late Dr. Causey, and entered upon his new duties on July 10.

Dr. H. Garnett Snead has been designated as assistant health officer of the Arlington County Health Department, effective on or aboout July 10.

New Hospital for Marion.

A modern hospital, with rooms for thirty-one patients, is to be erected in Marion in the near future, and will be known as the Lee Memorial Hospital. Dr. George A. Wright will be surgeon and physician in charge and he and the following doctors are listed among the directors: Drs. A. B. Graybeal, George D. Pettit, D. C. Boatwright, A. D. Hutton, and W. M. Sclater.

Officers in American Legion.

Drs. E. J. Nixon and L. S. Early have been named to the executive committee of the Petersburg Post, American Legion, for the coming year.

Home and School for "Exception" Children.

The Thompson Homestead School, located at Free Union, near Charlottesville, is especially adapted to the shy, nervous, retarded or unsocial child. Enrollment limited. For detailed information, write Mrs. J. Bascom Thompson, principal, Free Union, Va. (*Adv.*)

Medical Research Work Done.

Physician having access to complete medical library will locate references or do medical research of any kind. Fees reasonable. Address No. 38, care this JOURNAL, 1200 East Clay Street, Richmond. (*Adv.*)

Home for Convalescences.

A home for the care and treatment of chronic convalescences has been opened at Arrington, Nelson County, Virginia, under the direction of Dr. and Mrs. Fred M. Horsley. Information upon request. (*Adv.*)

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Obituary Record

Dr. Reuben William Bennett,

Well-known physician of Gretna, died July 13. He was sixty-three years of age and a graduate of the former University College of Medicine, Richmond, in 1899. Dr. Bennett had practiced in Pittsylvania County since his graduation. He was a Mason and had been a member of the Medical Society of Virginia for forty years. His wife and three children, one of them Dr. S .O. Bennett of Norfolk, survive him. Dr. R. A. Bennett, of Bedford, is one of his brothers.

Dr. Adam George White,

Prominent retired physician of Lynchburg, died June 3. He was a native of Aberdeen, Scotland, and eighty-one years of age. Dr. White graduated in medicine from the University of Illinois in 1890, and before coming to Lynchburg, practiced general surgery in Milwaukee for nearly thirty years. He was a member of the Medical Society of Virginia and of several other medical organizations. His wife died about three months ago. They are survived by one son, Dr. A. D. Ferguson White, of Lynchburg.

Dr. John Lewis Harvey,

Prominent physician of Floyd County, died June 27 after a long illness. He was fifty-three years of age and a graduate of the former University College of Medicine, Richmond, in 1909. Dr. Harvey was a member of the county board of health and a former member of the General Assembly. He had been a member of the Medical Society of Virginia since 1909.

Dr. Hiram Kilgore McConnell,

Prominent physician of Scott County, died July 14 after an illness of about two weeks. He was born in 1881 and received his degree from the former Hospital College of Medicine, Louisville, in 1907. Dr. McConnell had been a member of the Medical Society of Virginia for the past ten years. His wife, a daughter, and a son, Dr. Fred McConnell, survive him. He was a brother of Dr. R. W. McConnell, of Fort Blackmore, who died last April.

Dr. Henry Holmes Hunter,

Beloved physician of Whaleyville, died June 17, following an illness of several years. He was born in Gates County, North Carolina, in 1875, son of Dr. Henry Holmes Hunter, a surgeon in the War Between the States, and Mrs. Mary Cheek Hunter. He graduated in 1900 from the Medical College of Virginia, and was engaged in the practice of medicine thirty-seven years, twenty-two of which were spent in Whaleyville.

Dr. Hunter was a steward in the Methodist Church, a member of the Nansemond County School Board, of which he served as Chairman for a number of years, a former member of the Nansemond County Democratic Executive Board, a member of McAlister Lodge A.F. and A.M. of Whaleyville, a member of the Medical Society of Virginia and of the Nansemond County Medical Society.

In that part of the county where he spent so many years of his life, he was not only doctor, but friend and adviser for his people. Of gentle and kindly spirit, his gracious manner and wise help will be long remembered in his community. Surviving him are his wife, two daughters and a sister.

Dr. Herbert Mann,

Prominent Richmond physician, died July 7, after an illness of several weeks. He was born in Petersburg and graduated from the Medical College of Virginia in 1903. Dr. Mann served for sometime as an instructor at the College and had been chief surgeon of the Virginia State Penitentiary since 1913. He was a member of several medical and social fraternities. His wife and two children survive him.

Dr. Haliburton McCoy,

Puunene, Hawaii, died July 2 after an extended illness. He was a native of North Carolina and forty-nine years of age. Dr. McCoy graduated from the University of Virginia, Department of Medicine, in 1918, and formerly practiced in Crozet. His wife and three children survive him.

Major-General Walter Drew McCaw,

Retired, former assistant surgeon-general of the U. S. Army, died July 7 in Kingston, N. Y., having been in ill health for several years. He was a son of the late Dr. and Mrs. James Brown McCaw, of Richmond, and seventy-six years of age. Dr. McCaw graduated from the Medical College of Virginia in 1882 and began his army career in 1884, being retired in 1927. During his service in the Army, he received numerous awards and honors. A sister and several nieces and nephews, one of them Dr. J. McCaw Tompkins, of Richmond, survive him.

Dr. Buckner Magill Randolph,

Prominent retired physician of Washington, D. C., died at his home in Warrenton on July 1. He was sixty-seven years of age and a graduate of the Medical College of Virginia in 1898. Dr. Randolph was chief of the medical service at the Walter Reed Hospital during the World War and after the war was retired with the rank of Colonel. His wife and two children survive him.

Appreciation of Dr. M. P. Doyle.

Dr. Millard Percy Doyle was born at McKenney, Dinwiddie County, Virginia, on September 18, 1880. After his graduation in medicine at the Medical College of Virginia in 1907, he served one year as interne in the Norfolk Protestant, now the Norfolk General Hospital, following which he began the very successful practice of general medicine that was so sadly and unexpectedly terminated by his sudden death, on May 8.

In addition to his private professional work Dr. Doyle gave his time very liberally to those organizations that minister to the needs of the unfortunate and the indigent sick of the community. For thirty years he was an active member of the staff of the Florence Crittenden Home, of which at the time of his death he was serving his second term as president. Likewise for many years he was an active member of the staffs of St. Vincent's and the Norfolk Protestant Hospital and, since its reorganization, of the Leigh Memorial Hospital.

Among his patrons, no man was ever more highly regarded, and justly so, because their welfare and comfort were his principal concern. He loved people and the members of his church and of those civic organizations with which he was affiliated will long remember his great friendliness and faithfulness of his attendance on their meetings.

He was rarely absent from meetings of this society and though he did not often engage in technical discussions he was a keen listener, and profited by what he heard.

To those of us with whom he was more closely associated, he showed the happiest aspect of his character. Kindly and quietly dignified in his manner, he also had a very keen appreciation of humor and loved all kinds of sport. Baseball and football were his favorities, and when he could not attend games, the radio by his desk was his refuge.

Already, by his devoted patrons, and by his other friends, both within and without his professional sphere he is sadly missed and it is difficult for them with any great degree of equanimity to contemplate the passing from this life, at the period of his greatest usefulness, of this good man and capable physician.

THEREFORE, IT IS HEREWITH RESOLVED that this brief tribute to his memory shall be made a part of the permanent record of the Norfolk County Medical Society, a copy be sent to Dr. Doyle's family, and one to the VIRGINIA MEDICAL MONTHLY.

HARVIE S. BAKER,
F. D. WILSON,
N. G. WILSON,
Chairman.

The Committee appointed by the Staff of St. Vincent's Hospital drew up the following resolutions on Dr. Millard Percy Doyle.

Dr. Doyle, a native of Dinwiddie County, was born in 1881 and graduated from the Medical College of Virginia in 1907. After his graduation he was appointed on the House Staff of the Norfolk General Hospital and upon completion of his internship he immediately began the practice of medicine in Norfolk, which he continued until the time of his death.

He was active in civic affairs, having served as President of the Rotary Club, and President of the Florence Crittenden Training Home. He was a member of the Norfolk County Medical Society and the Medical Society of Virginia. At the time of his death, he was one of the Chiefs of the Medical Department of St. Vincent's Hospital.

WHEREAS on May 8, 1939, Dr. Doyle passed to his reward:

BE IT RESOLVED that St. Vincent's Hospital has lost one of its loyal friends.

BE IT ALSO RESOLVED that the physicians of the staff have lost a congenial associate and companion.

BE IT FURTHER RESOLVED that a copy of this resolution be spread on the minutes of the staff, and a copy be sent to the family of Dr. Doyle, and that they be published in the VIRGINIA MEDICAL MONTHLY.

J. WARREN WHITE,
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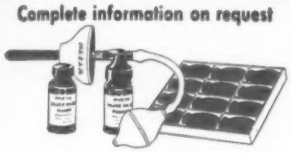

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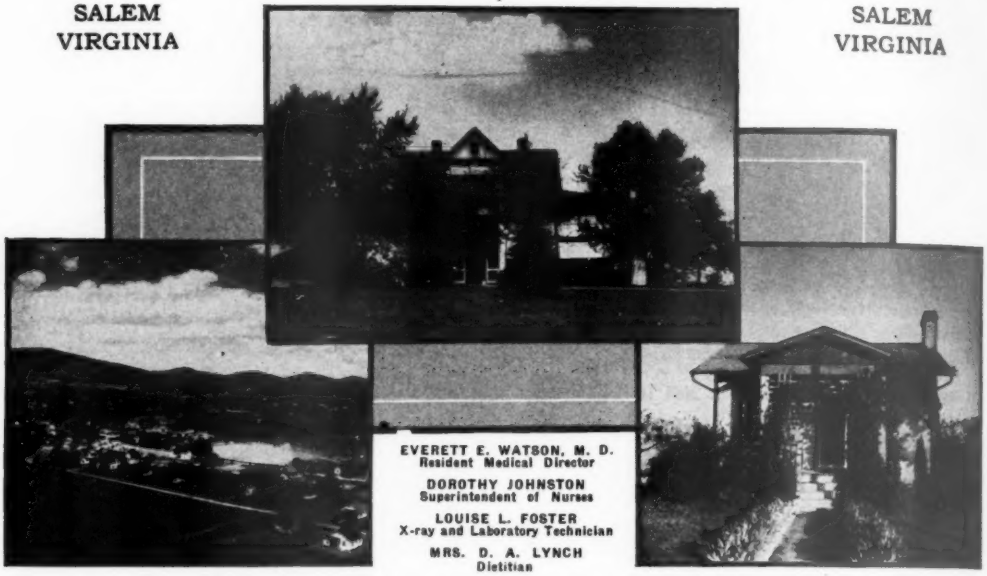

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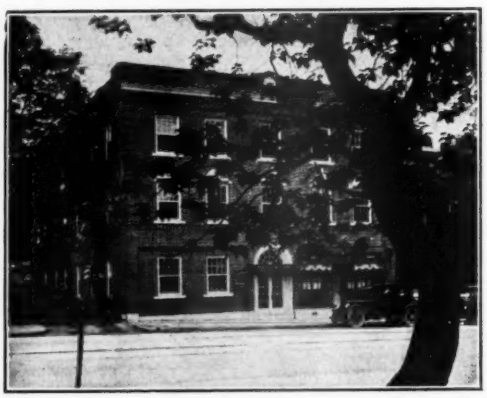

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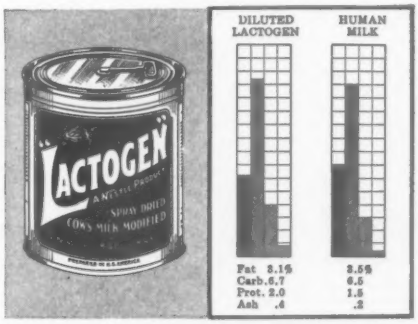

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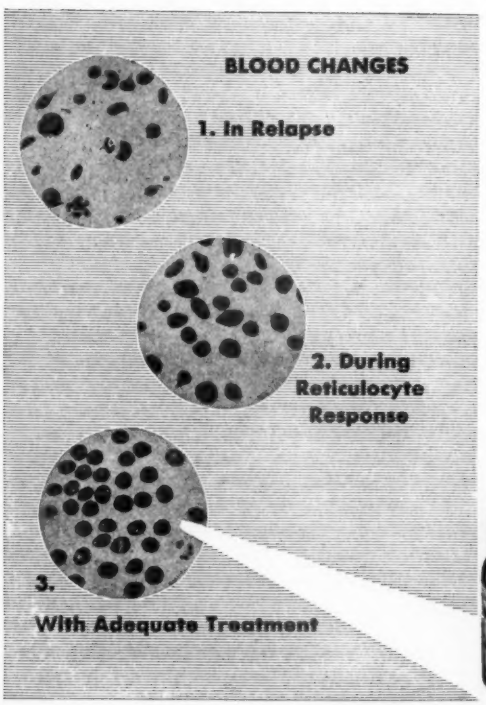

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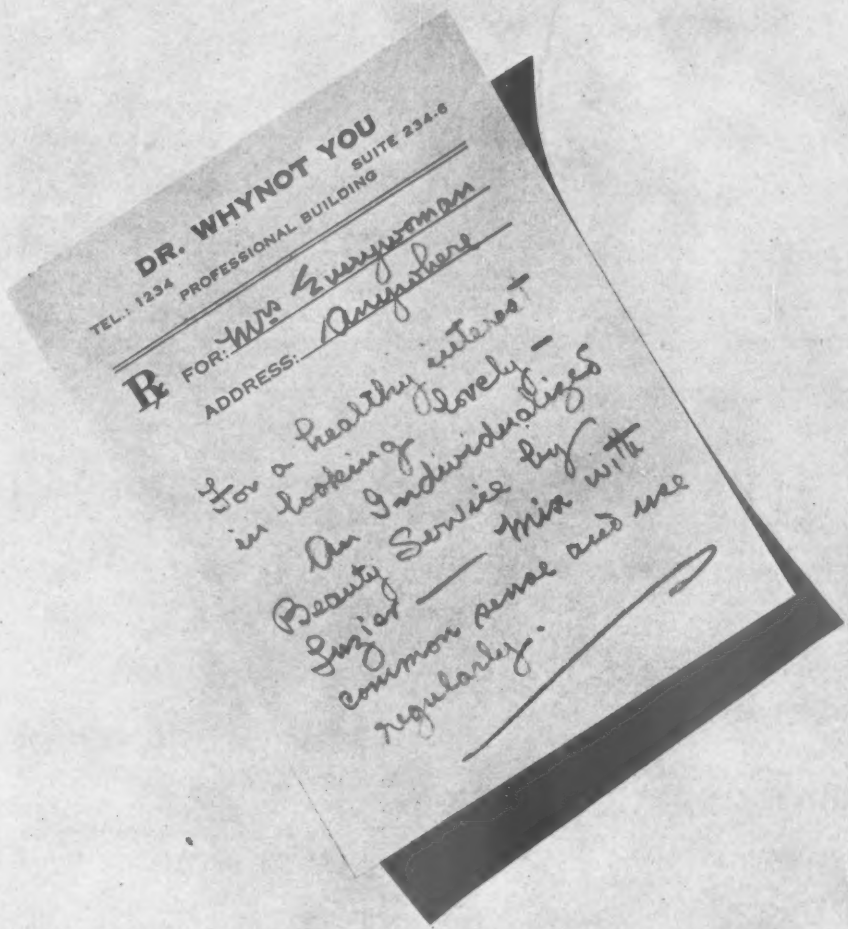

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In any climate, S.M.A. remains fresh and sweet, because it is nitrogen packed to prevent oxidation or change in its chemical and physical composition.

INFANTS RELISH S.M.A. — DIGEST IT EASILY — THRIVE ON IT!

S. M. A. is a food for infants — derived from tuberculin tested cows' milk, the fat of which is replaced by animal and vegetable fats including biologically tested cod liver oil; with the addition of milk sugar and potassium chloride; ACCEPTED AMERICAN MEDICAL ASSN. *altogether forming an antirachitic food. When diluted according to directions, it is essentially similar to human milk in percentages of protein, fat, carbohydrate and ash, in chemical constants of the fat and in physical properties.*

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